

# **FLORA OF EGYPT**

Volume Three

(*Verbenaceae - Compositae*)

**Loutfy Boulos**

Al Hadara Publishing  
Cairo, Egypt

2002

Cover photograph by the author (*Atractylis cancellata*)

First published December 2002

All rights reserved

Copyright © 2002 by  
Al Hadara Publishing  
7, Abou El-Seoud Street,  
Dokki 12311  
Cairo, Egypt

Tel.: (20-12) 316 48 67  
Fax: (20-2) 760 58 98  
E-mail: ask@alhadara.com  
E-mail: hadara@idsc.net.eg

[www.alhadara.com](http://www.alhadara.com)

No part of this book may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopy, recording or otherwise, without the prior written permission of the copyright owner.

Dar El-Kutub No. 18008/2002

I. S. B. N. 977-5429-25-0

Printed in Egypt

# FLORA OF EGYPT

Volume Three



## Contents

Foreword	vii	Acanthaceae	97
Preface	ix	Pedaliaceae	104
Acknowledgements	xi	Lentibulariaceae	106
Phytogeographical regions	xii	Plantaginaceae	108
Endemic taxa	xiii	Valerianaceae	121
Near-endemic taxa	xiii	Dipsacaceae	122
Abbreviations	xiv	Campanulaceae	129
References	xv	Sphenocleaceae	134
Verbenaceae	1	Compositae	134
Avicenniaceae	5	Glossary (Compositae)	318
Labiatae	6	Colour plates	321
Solanaceae	34	Index to line drawings	353
Scrophulariaceae	54	Index to colour photographs	357
Orobanchaceae	86	Index to scientific names	358
Globulariaceae	96		



## Foreword

I am delighted to contribute this Foreword to the third volume of Professor Boulos' new *Flora of Egypt*. My friendship with Loutfy Boulos dates back to the days when the international *Flora Europaea* project was in full swing, and in particular to Loutfy's accounts of the genera *Sonchus* and *Launaea*, which were published in the fourth volume of *Flora Europaea* in 1976. I was Editor of the Compositae subfamily *Cichorioideae*, and the liaison we developed, greatly helped of course by Loutfy's excellent command of English (and incidentally also French), blossomed into a strong family friendship which has lasted to the present day. Indeed there is a further reason why this new *Flora of Egypt* gives me much pleasure: the publishing firm Al-Hadara is the creation of Loutfy's elder son Elhamy, and the *Flora* is an impressive joint product of the Boulos family. Since my wife and I had the pleasure of Loutfy's two sons as guests in Cory Lodge, then my residence as Director of the Cambridge University Botanic Garden, in 1977, we feel we have significantly contributed to their careers!

Not least of the very considerable achievements on which the botanical world can congratulate the author of this *Flora* is the ability to keep to a strict time-table. In the case of the five-volume *Flora Europaea* - admittedly a much more complicated editorial project involving many authors - we estimated 12 years to complete the work, and in the event felt very satisfied when we did it in 22 years. The first volume of this *Flora* was published in 1999, the second late in 2000, and you should have this, the third volume, by the end of 2002. We can confidently expect the fourth and last volume, devoted to the Monocotyledons, to appear within five years of the first.

In this, your 70th year, we wish you, Loutfy, health and strength for the future to finish this excellent *Flora*.

Cambridge, July 2002

S Max Walters Sc.D., V.M.H.





## Preface

It gives me a great pleasure to present this volume, the third of four, which concludes the accounts of the dicot families of the Flora of Egypt. The volume covers 16 families of native and naturalized plants: Verbenaceae to Compositae, 16 families, comprising 174 genera, 450 species, and 30 infraspecific taxa. The sequence of families, as in volumes 1 and 2, follows more or less Engler's System. The largest families are: Compositae, 228 species in 98 genera; Scrophulariaceae, 58 species in 17 genera; Labiatae, 55 species in 23 genera; Solanaceae, 30 species in 8 genera; and Plantaginaceae, 20 species in one genus.

Line drawings of 384 species and infraspecific taxa are included in 77 plates, drawn by Margaret Tebbs, Madgy El-Gohary, Patricia Davies and Sally Dawson; 128 colour photographs of some species in their natural habitats, by the author, Rafik Khalil and Dina Aly are also provided. Indexes to the illustrated taxa in line drawings and to the colour photographs are given; these are also referred to in the general index to scientific names.

Nine species are reported new to the flora of Egypt in this volume: *Lantana camara*, a low shrub, naturalized in the Aswan area; *Blepharis attenuata*, annual or herbaceous perennial, in the Eastern Desert and Sinai; *Misopates microcarpum*, desert annual, in the Galala Mountains of the Eastern Desert; *Ageratum houstonianum*, annual weed, naturalized in the Nile region; *Dittrichia graveolens*, annual weed, naturalized in the western Mediterranean coastal region; *Ambrosia artemisiifolia*, annual weed, naturalized in the western Mediterranean coastal region; *Galinsoga parviflora*, annual weed, naturalized in the Nile region; *Calendula tripterocarpa*, desert annual, its occurrence is confirmed in the Eastern Desert and Sinai; *Launaea amal-aminiae*, a recently described species, known in Egypt from the Eastern Desert and Sinai.

Two more species, *Artemisia vulgaris* and *Artemisia verlotiorum*, are reported new to the flora, although further information to confirm whether they are naturalized, or are just casuals; each from an isolated report.

*Sonchus tenerrimus*, a very rare species, previously known in Egypt from a single locality in the western Mediterranean coastal region, at Bahig, west of Alexandria, was collected by the author from two other localities: Sollum plateau, near the frontier with Libya, 10 April 2000; and Agiba, west of Mersa Matruh, 4 March 2002.

The genus *Lantana* was represented in the flora by two species: *L. viburnoides* and *L. rugosa*. In the present work the latter species is listed as a synonym of the former. However, another species *Lantana camara*, naturalized in the Aswan area, is added to the flora as mentioned above. The genus *Blepharis* was represented in Egypt by one species: *B. ciliaris*, which proved, according to Vollesen (2000), to be an erroneous identification; its correct name is *B. edulis*. Another species, *B. attenuata* is reported new to the flora, as mentioned above, thus the genus *Blepharis* in Egypt is now represented by two species.

As regards the family Compositae, which constitutes over 50% of this volume, I discovered that my knowledge on that 'familiar' group, on which I have worked from 1957-1974, is now apparently in need of support from someone who is now actively

working on this difficult group of plants; and in the meantime is aware of the enormous amount of literature which has been accumulated ever since. I was indeed extremely lucky, besides very kindly being offered the facilities to work in Kew Herbarium and Library, to find this support in my colleague and friend Dr Nicholas Hind, who is in charge of the Compositae Section in the Kew Herbarium. Besides helping me in various ways, he has kindly accepted to co-author Compositae. I was unable to persuade him to act as the senior author, and thus the authorship for this family as it appears in this work is less due to my knowledge than to his modesty. Contrary to the format which has so far been followed in volumes 1 and 2, we both felt that it would be much more useful for the users of this Flora to enumerate the major literature titles dealing with some genera, especially those of Compositae.

The following nomenclatural changes, based on recently published taxonomic works, as well as on our studies during the last two years in the course of the preparation of the Compositae account, have been made: *Doellia bovei* is now the accepted name and replaces *Blumea bovei*; *Symphyotrichum squamatum* replaces *Aster squamatus*, *Limbarda crithmoides* replaces *Inula crithmoides*, *Dittrichia viscosa* replaces *Inula viscosa*, *Chiliadenus* (three species) replaces *Varthemia*, *Pulicaria undulata* replaces *P. crispa* (Syn. *Francoeuria undulata*), *Anacyclus monanthos* subsp. *monanthos* replaces *A. alexandrinus*, *Lasiospermum brachyglossum* replaces *L. brachyglossum* var. *sinaicum*, *Glebionis coronaria* replaces *Chrysanthemum coronarium*, *Seriphidium herba-album* replaces *Artemisia herba-alba*, *Launaea fragilis* replaces *L. resedifolia*, *Heteroderis pusilla* var. *leucocephala* replaces *Crepis aegyptiaca* (Syn. *Heteroderis aegyptiaca*) and *Scariola orientalis* replaces *Lactuca orientalis*.

The five species of *Gnaphalium* known from Egypt are classified here under three genera: *Homognaphalium* (2 species), *Pseudognaphalium* (1) and *Gnaphalium* (2). The genus *Blainvillea* was formerly represented in Egypt by two species: *B. acmella* and *B. gayana*. In this work only one species: *B. acmella* is accepted, while *B. gayana* goes, together with many other names, to a long list of synonyms. The genus *Anthemis* was previously represented in Egypt by 14 species; in this work only 12 species are recognized, as a result of a critical study based on ample material from Egypt and some neighbouring countries. The general distribution of certain species, e.g. *Anthemis retusa* and *A. indurata*, is subsequently updated.

The currently illegitimate generic name *Volutaria* Cass. is used in this work for four Egyptian species to stabilize the taxonomy of this group (see note p. 174). A formal proposal to conserve this name will be put to the Spermatophyte committee.

A glossary to some botanical terms, used in Compositae, is presented at the end of the family account.

L. Boulos

Cairo, October 2002

## Acknowledgements

I am most grateful to Professor Simon Owens, Keeper of the Herbarium, Royal Botanic Gardens, Kew, as well as to all the members of staff of the Herbarium and Library for the use of the facilities, and for their most kind help. Without their support this work would have never been realized. I also extend my thanks to Kew for sending me a loan of herbarium material to Cairo.

I am privileged and honoured for contributions in this volume by eminent botanists, colleagues and friends: Max Walters, Cambridge, contributed the Foreword; Nigel Hepper, Kew, contributed Solanaceae; Sven Snogerup, Lund, co-authored Plantaginaceae; Britt Snogerup, Lund, co-authored Scrophulariaceae; Nicholas Hind, Kew, co-authored Compositae. The following colleagues at Kew kindly revised manuscripts or helped in different ways: Bernard Verdcourt (Pedaliaceae, Verbenaceae), Ray Harley (Labiatae), Mark Coode (Valerianaceae), Kaj Vollesen (Acanthaceae). I have also received valuable help and criticism from other colleagues: Mohammad Qaiser, Karachi (Compositae); John Wood, London (Acanthaceae); Ib Friis, Copenhagen (Solanaceae); Norbert Kilian, Berlin (*Launaea*); Tim Upson, Cambridge (*Lavandula*); Ensermu Kelbessa, Addis Ababa (*Justicia*); Adel El-Gazzar, Cairo (comments on some keys).

John Akeroyd carefully revised the entire typescript and has kindly contributed numerous corrections. I wish to extend my sincere thanks to Tom Cope, Kew, who was always ready to help in various ways during my extended visits to Kew. The botanical artists Margaret Tebbs, Magdy El-Gohary, Patricia Davies and Sally Dawson deserve here my gratitude for their great skill and patience to produce such high standard art work. I also thank Rafik Khalil and Dina Aly for providing several colour photographs.

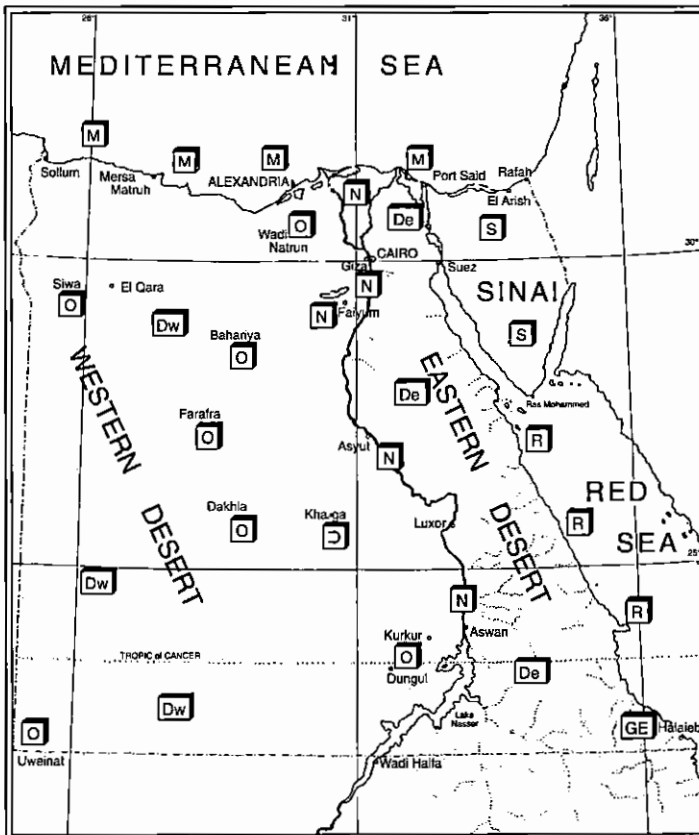
My sincere thanks go to my Egyptian colleagues who kindly provided transportation and field facilities during my botanical excursions: Ismail Abdel-Galil Hussein, Desert Research Centre, Cairo; Rafik El-Gharib, Alexandria University; Mostafa Saleh, Al-Azhar University; Salah El-Naggar and Momen Zareh, Assiut University; Ibrahim Mashali, Mansoura University.

Colour photographs by Rafik Khalil and Dina Aly: *Salvia multicaulis*, *Teucrium polium*, *Hyoscyamus boveanus*, *Centaurea eryngioides*, *Iphiona mucronata*, *Pulicaria undulata* (general view) and *Reichardia tingitana*.

Line drawings by Magdy El-Gohary from Boulos, L. 1983. Medicinal plants of North Africa, Reference Publications, Algonac, Michigan: *Datura stramonium*, *Hyoscyamus muticus*, *H. ablus*, *Centaurea calcitrapa*, *C. alexandrina*, *Ambrosia maritima*, *Eclipta prostrata*, *Artemisia judaica* and *Seriphidium herba-album*.

## Phytogeographical regions

- N:** The Nile region including the delta, valley and Faiyum.
- O:** The oases of the Westerr: Desert: Wadi Natrun, Siwa, Farafra, Bahariya, Kharga, Dakhla, Kurkur, Dungul and Uweinat.
- M:** The Mediterranean coastal strip from the border with Libya near Sollum to Port Said.
- D:** All the deserts of Egypt except that of Sinai.
- De:** Desert east of the Nile except that of Sinai.
- Dw:** Desert west of the Nile.
- R:** The Red Sea coastal strip.
- GE:** Gebel Elba and the surrounding mountainous region.
- S:** The entire Sinai peninsula including the coastal Mediterranean strip and El-Tih Desert east of Suez Canal.



## Endemic taxa in this volume

- Origanum syriacum* L. subsp. *sinaicum* (Boiss.) Greuter & Burdet (S).  
*Micromeria serbaliana* Danin & Hedge (S).  
*Ballota kaiseri* Täckh. (S).  
*Phlomis aurea* Decne. (S).  
*Hyoscyamus boveanus* (Dunal) Asch. & Schweinf. (N, O, De, R, S).  
*Anarrhinum pubescens* Fresen. (S).  
*Veronica kaiseri* Täckh. (S).  
*Veronica anagalloides* Guss. subsp. *taeckholmiorum* Chrtek (N).  
*Veronica catenata* Pennell subsp. *pseudocatenata* Chrtek & Osb.-Kos. (N, O, R).  
*Plantago sinaica* (Barn.) Decne. (S).  
*Pterocephalus arabicus* Boiss. (S).  
*Echinops taekholmiana* Amin (N).  
*Atractylis carduus* (Forssk.) C. Chr. var. *marmarica* Täckh. & Boulos (M, Dw).  
*Ifloga spicata* (Forssk.) Sch.Bip. subsp. *elbaensis* Chrtek (GE).  
*Phagnalon nitidum* Fresen. (De, S).  
*Anthemis microsperma* Boiss. & Kotschy (M, S).  
*Senecio belbeysius* Delile (N).  
*Scorzonera drarii* Täckh. (S).  
*Sonchus macrocarpus* Boulos & C. Jeffrey (N, M, De).

## Near-endemic taxa

- Origanum isthmicum* Danin (Sinai, Palestine).  
*Thymus decussatus* Benth. (Sinai, northwest Saudi Arabia).  
*Micromeria sinaica* Benth. (Sinai, southern Palestine).  
*Nepeta septemcrenata* Benth. (Sinai, northwest Saudi Arabia).  
*Solanum sinaicum* Boiss. (Sinai, Palestine).  
*Withania obtusifolia* Täckh. (Egypt, Palestine).  
*Lycium schweinfurthii* Dammer subsp. *aschersohnii* (Dammer) Feinbrun (Egypt, Palestine).  
*Verbascum fruticosum* Post (Sinai, Palestine).  
*Verbascum letourneuxii* Asch. & Schweinf. (Egypt, Libya).  
*Verbascum schimperianum* Boiss. (Sinai, southern Palestine).  
*Linaria joppensis* Bornm. (Sinai, Palestine).  
*Kickxia macilentata* (Decne.) Danin (Sinai, Palestine).  
*Kickxia floribunda* (Boiss.) Täckh. & Boulos (Egypt, Palestine).  
*Veronica scardica* Griseb. (Egypt, Sudan).  
*Blepharis attenuata* Napper (Egypt, Palestine).  
*Plantago crypsoides* Boiss. (Egypt, Libya).  
*Valerianella petrovitchii* Asch. (Egypt, Libya).  
*Campanula dulcis* Decne. (Sinai, Palestine).  
*Echinops galalensis* Schweinf. (Egypt, Libya).  
*Atractylis boulosii* Täckh. (?Sinai, Palestine).  
*Atractylis serratuloides* Sieber ex Cass. (Egypt, Palestine).  
*Onopordum alexandrinum* Boiss. (Egypt, southern Palestine).  
*Centaurea glomerata* Vahl (Egypt, Libya).  
*Centaurea alexandrina* Delile (Egypt, Libya).  
*Carthamus glaucus* M. Bieb. (Egypt, Libya).  
*Carduncellus mareoticus* (Delile) Hanelt (Egypt, Libya).  
*Phagnalon sinaicum* Bornm. & Kneuck. (Sinai, Saudi Arabia).  
*Anthemis indurata* Delile (Egypt, Palestine).  
*Picris sulphurea* Delile (Egypt, Saudi Arabia).  
*Crepis libyca* (Pamp.) Shab. (Egypt, Libya).

## Abbreviations

<i>auct.</i>	<i>auctorum</i> : of authors.
<i>auct. mult.</i>	<i>auctorum multorum</i> : of many authors.
<i>c.</i>	<i>circa</i> : around.
<i>comb. inval.</i>	<i>combinatio non rite publicatum</i> : combination not validly published.
<i>comb. nov.</i>	<i>combinatio nova</i> : nomenclatural new combination.
<i>et al.</i>	<i>et alii</i> : and others.
<i>excl.</i>	<i>exclusus</i> : excluded.
<i>l. c.</i>	<i>loco citato</i> : on the page perviously cited.
<i>nom. ambig.</i>	<i>nomen ambiguum</i> : ambiguous name.
<i>nom. confus.</i>	<i>nomen confusum</i> : confused name.
<i>nom. conserv.</i>	<i>nomen conservandum</i> : conserved name.
<i>nom. et orth. conserv.</i>	conserved name and orthography.
<i>nom. illeg.</i>	<i>nomen illegitimum</i> : illegitimate name.
<i>nom. non rite publ.</i>	name not validly published.
<i>nom. nud.</i>	<i>nomen nudum</i> : name unaccompanied by a description.
<i>nom. rejic.</i>	<i>nomen rejiciendum</i> : rejected name.
<i>nom. superfl.</i>	<i>nomen superfluum</i> : name superfluous when published.
<i>obs.</i>	<i>observatio</i> : observation.
<i>op. cit.</i>	<i>opere citato</i> : in the work previously cited.
<i>p. p.</i>	<i>pro parte</i> : in part.
<i>sensu lat.</i>	<i>sensu lato</i> : in a broad sense.
<i>s. n.</i>	<i>sine numero</i> : without a number.
<i>sensu str.</i>	<i>sensu stricto</i> : in a strict sense.
<i>syn.</i>	synonym.
<i>syns.</i>	synonyms.
<i>typ. conserv.</i>	conserved type.

Abbreviations of the authors' names follow those proposed by R. K. Brummitt & C. E. Powell, *Authors of Plant Names*, Kew (1992).

## References

(mainly the basic floras)

- Ali, S. I., Jafri, S. M. H. & El-Gadi, A. (eds) 1977-1989. Flora of Libya. Al Faateh Univ., Tripoli.
- Andrews, F. W. 1950-1956. The flowering plants of the Sudan. vols. 1-3. Arbroath, Scotland.
- Beentje, H. J. in Beentje, H. J. & Smith, S. A. L. (eds) 2002. Flora of Tropical East Africa. Compositae, part 2. Balkema, Rotterdam.
- Boissier, E. 1867-1888. Flora Orientalis, vols. 1-5 & Suppl. Genève, Bâle, Lyon.
- Boulos, L. 1983. Medicinal plants of North Africa. Reference Publications. Algonac, Michigan.
- Boulos, L. 1995. Flora of Egypt Checklist. Al-Hadara Publishing, Cairo.
- Boulos, L. & El-Hadidi, M, N. 1994. The Weed Flora of Egypt. American Univ. Press, Cairo.
- Bremer, K. 1994. Asteraceae: Cladistics and Classification. Timber Press, Portland, Oregon.
- Bremer, K. & Humphries, C. J. 1993. Generic monograph of the Asteraceae-Anthemideae. Bull. Nat. Hist. Mus. Lond. (Bot.) 23(2): 71-177.
- Collenette, S. 1999. Wildflowers of Saudi Arabia. NCWCD, Riyadh.
- Davis, P. H. *et al.* (eds). 1975, 1978, 1982. Flora of Turkey and the East Aegean Islands, vols. 5, 6, 7. Univ. Press., Edinburgh.
- Edwards, S., Mesfin Tadesse & Hedberg, I. (eds). 1995. Flora of Ethiopia and Eritrea. vol. 2, part 2, Addis Ababa.
- Feinbrun-Dothan, N. 1978. Flora Palaestina, vol. 3. Israel Academy of Sciences and Humanities, Jerusalem.
- Greuter, W., Burdet, H. M. & Long, G. (eds). 1984, 1986, 1989. Med-Checklist, vols. 1, 3, 4. Conservatoire et Jardin botanique, Genève.
- el-Hadidi, M. N. (ed.). 1980, in progress. Flora of Egypt, Taeckholmia, Additional series, Cairo.
- Hedberg, I. & Edwards, S. (eds). 1989. Flora of Ethiopia, vol. 3. Addis Ababa, Asmara, Uppsala.
- Heller, D. & Heyn, C. C. 1986, 1987, 1993. Conspectus Florae Orientalis, fascicles 3, 4, 8. Israel Academy of Sciences and Humanities, Jerusalem.
- Hepper, F. N. & Friis, I. 1994. The plants of Pehr Forsskål's Flora Aegyptiaco-Arabica. Royal Botanic Gardens, Kew.
- Jeffrey, C. & Beentje, H. J. in Beentje, H. J. & Smith, S. A. L. (eds). 2000. Flora of Tropical East Africa. Compositae, part 1. Balkema, Rotterdam.
- Mabberley, D. J. 1997. The Plant Book, ed. 2. Cambridge Univ. Press, Cambridge.

- Mandaville, J. P. 1990. Flora of Eastern Saudi Arabia. Kegan Paul International Ltd., London, New York, Riyadh.
- Meikle, R. D. 1977, 1985. Flora of Cyprus, vols. 1, 2. Bentham-Moxon Trust, Royal Botanic Gardens, Kew.
- Mouterde, P. 1960, 1970. Nouvelle Flore du Liban et de la Syrie, vols. 1, 2. Dar El-Machreq, Beirut.
- Muschler, R. 1912. A Manual Flora of Egypt. vols. 1 & 2, Berlin.
- Nasir, E. & Ali, S. I. (eds). 1970, in progress. Flora of Pakistan. Dept of Botany, Univ. of Karachi, Karachi.
- Sutton, D. A. 1988. A revision of the Tribe Antirrhineae. British Museum (Natural History), London.
- Täckholm, V. 1974. Students' Flora of Egypt, ed. 2. Publ. Cairo Univ., Beirut.
- Täckholm, V. & Boulos, L. 1974. Supplementary Notes to Students' Flora of Egypt. Publ. Cairo Univ. Herb. 5.
- Thulin, M. (ed.). 1993, 1999. Flora of Somalia, vols.1, 2. Royal Botanic Gardens, Kew.
- Townsend, C. C. & Guest, E. (eds). 1966-1980. Flora of Iraq, vols. 1-4. Ministry Agric., Baghdad.
- Tutin, T. G. *et al.* (eds). 1968, 1972, 1976. Flora Europaea, vols. 2, 3, 4. Cambridge Univ. Press, Cambridge.
- Wood, J. R. I. 1997. A Handbook of the Yemen Flora. Royal Bot. Gardens, Kew.



## VERBENACEAE

L. Boulos

Herbs, shrubs, trees or woody climbers; leaves usually opposite, sometimes whorled, rarely alternate, simple, digitately or pinnately divided; stipules 0; inflorescence cymose, usually bracteate; flowers bisexual, usually zygomorphic; calyx 5-lobed or 5-toothed, persistent, sometimes accrescent in fruit; corolla 4-5-lobed, sometimes bilabiate; stamens 4, epipetalous, didynamous, rarely 5, or 2 with 2 staminodes, or 0; ovary superior, sessile; carpels usually 2, axile; style terminal, solitary, 2-5-lobed above; fruit a drupe, or of 2-4 nutlets. 41 genera, 950 species, tropical regions, but especially South America, few temperate.

- |   |                   |
|---|-------------------|
| 1. Stems creeping and rooting at the nodes; hairs medifixed | 3. <b>Phyla</b>   |
| + Stems and hairs not as above                              | 2                 |
| 2. Fruit of four 1-seeded nutlets                           | 4. <b>Verbena</b> |
| + Fruit of 2 pyrenes  | 3                 |
| 3. Fruit with a hard pericarp                               | 2. <b>Priva</b>   |
| + Fruit a fleshy drupe                                      | 1. <b>Lantana</b> |

### 1. **Lantana L.**

Shrubs, climbers or herbs; stems scabrid-hairy or prickly; leaves opposite, usually aromatic, toothed, glandular-punctate; flowers sessile, in axillary pedunculate heads or spike-like inflorescences; flowers bracteate; calyx small, membranous, truncate or sinuate-dentate; corolla infundibular, red, yellow, purple, mauve or whitish; limb obscurely 2-lipped, 4-5-lobed; stamens 4, didynamous, included; ovary 2-locular, each locule with 1 ovule; style short; stigma thick, oblique; fruit a fleshy drupe separating into two 1-locular pyrenes. 150 species, mainly tropical America, few tropical and South Africa.

- |  |                          |
|--|--------------------------|
| 1. Stems covered with recurved prickles; all leaves opposite;<br>bracts of the inflorescence 1-2 mm broad, linear-lanceolate;<br>inflorescence not elongating after anthesis   | 1. <b>L. camara</b>      |
| + Stems without prickles; leaves opposite, occasionally in whorls of 3;<br>bracts of the inflorescence 5-8 mm broad, broadly ovate;<br>inflorescence elongating after anthesis | 2. <b>L. viburnoides</b> |

1. **Lantana camara L.**, Sp. Pl., ed. 1, 627 (1753).

Syns. *Lantana aculeata* L., Sp. Pl., ed. 1, 627 (1753).

*Lantana antidotalis* Schumach. & Thonn., Beskr. Guin. Pl. 276 (1827).

*Lantana camara* L. var. *aculeata* (L.) Mold., Torreya 34:9 (1934).

Aromatic shrub 0.4-1.5 m; stems spreading,  $\pm$  square in section, covered with recurved prickles; all leaves opposite, 2-8 x 2-5 cm, ovate, scabrid-rugose with course tubercle-based hairs, acute, crenate-serrate, the base subcordate; petiole 0.8-1.8 cm; flowers in axillary heads 2.5-4 cm diam.; peduncle 1.5-6 cm; bracts 4-8 x 1-2 mm; calyx 3-4 mm; corolla 0.8-1.2 cm, red, purple, pink, orange or yellow; corolla-tube densely puberulent

outside; limb 4-8 mm, the lobes  $\pm$  rounded; drupes 4-5.5 mm diam., fleshy, dark purple to black; pyrene c. 3.5 mm diam.

N (Aswan); waste moist ground, naturalized. Probably native to West Indies, widely naturalized in many tropical and subtropical regions.

NOTE: The plant is a popular ornamental shrub, usually grown as a hedge in gardens and parks, naturalized in the Aswan area.

2. **Lantana viburnoides** (Forssk.) Vahl, Symb. Bot. 1: 45 (1790).

Syns. *Charachera viburnoides* Forssk., Fl. Aegypt.-Arab. CXV, 116, 379 (1775).

*Charachera tetragona* Forssk., Fl. Aegypt.-Arab. CXV, 115, 378 (1775).

*Lantana salviifolia* sensu Baker, Fl. Trop. Afr. 5: 277 (1900); sensu Täckh., Stud. Fl. Egypt, ed. 2, 123 (1974).

*Lantana rugosa* sensu Täckh., Stud. Fl. Egypt, ed. 2, 123 (1974).

Shrub 0.4-1.6 m; stems appressed-hairy, without prickles; leaves opposite, occasionally in whorls of 3, 1.5-3.5 x 1-3 cm, oblong-elliptic, scabrid-pubescent, crenate, acute to obtuse, the base rounded; petiole 0.3-1.5 cm; peduncle 2-8 cm; heads 1.5-2.5 cm diam., elongate in fruit; bracts 0.5-1.5 x 0.5-0.8, broadly ovate, acuminate; calyx 2 mm; corolla 5-6 mm, white or pink; limb 4-5 mm; drupe 2.5-3.5 mm, subglobose, purple.

GE; hillsides. Southeast Egypt, Sudan, Ethiopia, tropical East Africa, Somalia, Zambia Zimbabwe, Malawi, Mozambique, Angola, Arabia.

2. **Priva** Adans.

Scabridulous-pubescent perennial herbs or low shrubs; leaves opposite or subopposite; simple; inflorescence raceme-like; flowers small; calyx tubular, 5-ribbed, persistent and including the fruit; corolla white or coloured, funnel-shaped or hypocrateriform; tube cylindrical, dilated at the throat; limb 2-lipped; lobes 5, unequal; stamens 4, didynamous, included; 1 minute staminode sometimes present; ovary 2(-4)-locular, each locule 1-2-ovular; style terminal, filiform, 2-lobed at the apex; fruit splitting into two 1-2-locular pyrenes; pericarp hard, echinate on the dorsal surface. 20 species, tropical and warm regions.

1. **Priva adhaerens** (Forssk.) Chiov., Boll. Soc. Bot. Ital. 1923: 115 (1923).

Syns. *Ruellia adhaerens* Forssk., Fl. Aegypt.-Arab. 114 (1775).

*Priva dentata* Juss., Ann. Mus. Hist. Nat. Paris 7: 70 (1806).

*Priva abyssinica* Jaub. & Spach, Ill. Pl. Orient. 5: 57, 58, t. 453, 454 (1855).

*Priva cordifolia* sensu auct., non (L.f.) Druce

Pubescent low shrub 0.5-1.2 m; stems much-branched, woody at the base; leaves 2-6 x 1-4.5 cm, ovate, coarsely serrate, acute, the base subcordate to truncate, finely pubescent with tubercle-based bristly hairs and longer hooked bristles rendering leaves adherent; petiole 1.5-3.5 cm; spikes 10-30 cm; bracts 2-3.5 mm, linear; pedicel 1-2 mm in fruit; calyx 6-8 mm, densely covered with hooked hairs; calyx-lobes 1-1.5 mm in fruit; corolla c. 1 cm, white, drying dark; limb 5-6 mm diam., the lobes 2.5-3 mm, rounded; fruiting calyx beaked; pyrenes 5-7.5 mm, subglobose, with 2 rows of puberulent spines.

GE; wadi beds. Southeast Egypt, Sudan, Ethiopia, Eritrea, Kenya, Tanzania, Arabia.

### 3. *Phyla* Lour.

Perennial herbs; stems angular, trailing, rooting at the nodes; leaves opposite, simple, with appressed medifixed hairs; flowers in long-pedunculate, axillary bracteate spikes; calyx membranous, 2-lobed; corolla with short tube, the limb 4-lobed; stamens 4, included; fruit 2 nutlets, enclosed by the persistent calyx. About 6 species, tropical and temperate America, naturalized elsewhere.

#### 1. *Phyla nodiflora* (L.) Greene, *Pittonia* 4: 46 (1899).

Syns. *Verbena nodiflora* L., *Sp. Pl.*, ed. 1, 20 (1753).

*Lippia nodiflora* (L.) Michx, *Fl. Bor. Amer.* 2: 15 (1803).

Perennial; stems 20-50 cm, creeping, rooting at the nodes, covered with fine medifixed hairs; leaves 0.5-3.5 x 0.2-1.5 cm, obovate to oblanceolate, acute, serrate towards the apex, the base cuneate; spikes 0.5-2.5 cm, cylindrical; bracts 2-3 x 3-4 mm, broadly obovate; peduncle 1.5-6 cm; calyx 1.5 mm, split almost to base; corolla 1.4-1.6 mm, mauve or white; corolla-lobes 0.6-0.8 mm diam., unequal; stamens 4, didynamous; stigma obliquely capitate; fruit *c.* 1.2 mm, obovoid, divided into 2 pyrenes.

N, O, M, D, S; moist ground, canal banks. Widespread in tropical, subtropical and warm regions.

### 4. *Verbena* L.

Annual or perennial herbs or low shrubs; leaves opposite or sometimes in whorls of 3, simple, dentate or deeply divided; flowers in spikes or panicles of spikes, bracteate, terminal; calyx tubular, (4-)5-toothed, 5-ribbed; corolla funnel-shaped or hypocrateriform; tube pubescent within; limb 5-lobed,  $\pm$  2-lipped; stamens usually 4, included, didynamous; ovary 4-locular, each locule with 1 ovule; style slender, short; stigma unequally 2-lobed; fruit of 4 nutlets, enclosed by the persistent calyx. About 200 species, tropical and temperate America, few Old World.

#### 1. Perennial; stems erect; leaves coarsely and irregularly pinnatifid to pinnatisect;

inflorescence 10-30 cm, lax, of numerous spikes

1. *V. officinalis*

#### + Annual; stems procumbent; leaves pinnatisect into small lobes;

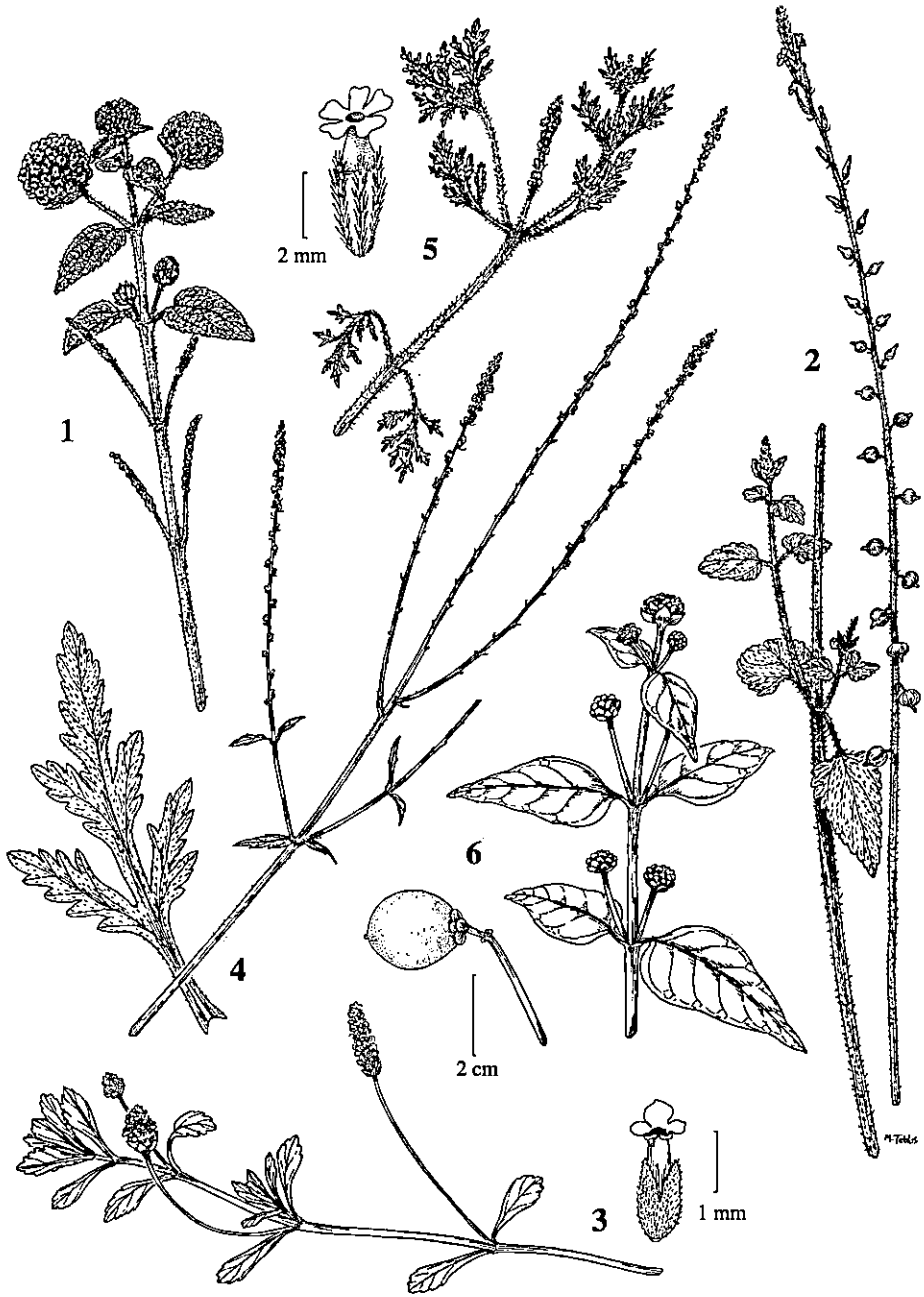
inflorescence 2-5 cm, compact

2. *V. supina*

#### 1. *Verbena officinalis* L., *Sp. Pl.*, ed. 1, 20 (1753).

Perennial 30-80 cm; stems erect, woody at the base, 4-angled,  $\pm$  glabrous; leaves 2.5-8 x 1-6 cm, lanceolate, irregularly pinnatifid to pinnatisect; lobes acute, serrate, hispid; base cuneate into a winged petiole; inflorescence 10-30 cm, lax, of numerous spikes; flowers minute; bracts glandular-hairy; calyx *c.* 2 mm, glandular-hairy; teeth 0.4 mm, triangular; corolla *c.* 3 mm, pink or lilac, exserted; stamens inserted at 2 levels; style *c.* 1 mm; nutlets 1.5-2 mm, oblong, brown, reticulate.

N, O, M; Nile and canal banks, moist ground. Europe, Egypt, Palestine, Sudan, Ethiopia, tropical East Africa, Zambia, Zimbabwe, South Africa.



**Plate 1. VERBENACEAE:** *Lantana viburnoides* 1, flowering branch. *Priva adhaerens* 2, flowering and fruiting branch; vegetative branch (left). *Phyla nodiflora* 3, flowering and fruiting branch; flower (up right). *Verbena officinalis* 4, flowering branch and basal leaf. *Verbena supina* 5, flowering branch; flower (left). **AVICENNIACEAE:** *Avicennia marina* 6, flowering branch; fruit (left). All drawings to the same scale, except the enlarged flowers (scale given). Drawn by Margaret Tebbs.

## 2. *Verbena supina* L., Sp. Pl., ed. 1, 21 (1753).

Annual, 10-40 cm; stems procumbent, much-branched from the base; leaves 1.5-4 x 1-2.5 cm, deltoid, petiolate, pinnatisect into small lobes; lobes dentate, subacute; inflorescence 2-5 cm, compact; bracts 1-1.5 mm, strigose; calyx 2-2.5 mm, strigose, with 4 prominent ribs; corolla 4-5 mm, lilac, the throat yellowish; limb c. 2.5 mm diam.; throat hairy outside, with a ring of hairs within; stamens inserted just below the ring of hairs; nutlets c. 2 mm, brown, reticulate.

N, O, M; Nile and canal banks, moist ground. Canary Islands, Portugal, Mediterranean region, Iraq, Arabia, Caucasus, Central Asia, southern Russia, tropical East Africa.

## AVICENNIACEAE

### L. Boulos

Description and distribution as for *Avicennia*, the only genus in the family.

### 1. *Avicennia* L.

Evergreen mangroves, trees or shrubs; vertical pneumatophores arising from horizontal roots; leaves opposite, simple, coriaceous, entire, exstipulate; flowers sessile, in terminal and axillary cymes, regular, subtended by an involucre of 1 bract and 2 bracteoles; calyx deeply 5-lobed; corolla-tube short, campanulate, 4-lobed; stamens 4, inserted at the throat; filaments short; ovary with free-central placentation; ovules 4; style shortly divided; capsule opening by 2(-4) valves, 1-seeded. About 5 species, coasts of warm and tropical regions.

#### 1. *Avicennia marina* (Forssk.) Vierh., Denkschr. Akad. Wiss. Wien, Math.-Nat. 71: 435 (1907).

Syns. *Sceura marina* Forssk., Fl. Aegypt.-Arab. 37 (1775).

*Avicennia officinalis* sensu Klotzsch in Peters, Reise Mossamb., Bot. 1: 266 (1861).

Small tree or shrub 2-5(-8) m; bark brownish-green, smooth; pneumatophores 10-25 cm; leaves 3-8 x 1.5-4 cm, ovate-elliptic to elliptic-lanceolate, entire, acute, the base cuneate; yellow-green and glabrous on the upper surface, whitish-tomentose on the lower; petiole 0.2-1.2 cm; flowers in small dense heads 0.6-1.2 cm; bracts and bracteoles 2-3.5 x 1.5-2.5 mm, acute, ciliate; sepals 3-4 x 2.5-3 mm, broadly ovate, tomentose outside; corolla yellow to orange; corolla-tube 2-3 mm; ovary 2-2.5 mm, narrowly conical; style 0.8 mm, 2-fid, glabrous; capsule 1.5-2.5 x 1-2 cm, subglobose; seeds usually single, compressed.

R, S; coastal mud flats, tidal zone. Tropical seashores and estuary river banks of the Old World.

NOTE: The foliage is often used as a forage for camels, the wood is used for boat building and as a fuel, the bark yields a brown dye.

# LABIATAE

## L. Boulos

Annual or perennial herbs, shrubs or rarely trees, usually aromatic; stems mostly 4-angled; leaves decussate, simple, undivided or variously divided; stipules 0; inflorescence usually of axillary cymes forming whorls of verticillasters and subtended by 2 floral leaves or bracts; flowers zygomorphic, (4-)5-merous, bisexual, or occasionally female, bracteate; calyx (4-)5-lobed or dentate, often bilabiate; corolla usually bilabiate, upper lip 2-lobed, the lower 3-lobed; stamens 4, didynamous, rarely 2; hypogynous disc often present, nectariferous; pistil 1; carpels 2; ovary superior, divided mostly to base into four 1-locular, 1-ovulate lobes; style 1, mostly gynobasic; stigma 2-lobed; fruit of 4, 1-seeded nutlets, enclosed by the calyx, rarely shallowly lobed or grooved and separating into 4 pyrenes (*Clerodendrum*); endosperm absent. 280 genera, 6700 species, cosmopolitan, but especially Mediterranean region to Central Asia.

- |   |                                    |
|---|------------------------------------|
| 1. Fertile stamens 2  | 2                                  |
| + Fertile stamens 4   | 3                                  |
| 2. Perennial or low shrub; calyx 2-lipped   | 9. <i>Salvia</i>                   |
| + Annual; calyx of 5 short ± equal teeth  | 8. <i>Ziziphora</i>                |
| 3. Corolla ± regular; limb of ± equal lobes   | 4                                  |
| + Corolla distinctly bilabiate  | 5                                  |
| 4. Leaves 2-3.5 mm broad, oblong-linear, margin entire; corolla dull yellow                           | 3. <i>Lavandula atriplicifolia</i> |
| + Leaves 0.5-1.8 cm broad, broadly ovate to ovate-lanceolate, margin serrate; corolla pink to lilac   | 4. <i>Mentha</i>                   |
| 5. Only the lower lip of the corolla developed  | 6                                  |
| + Upper and lower lips developed  | 7                                  |
| 6. Lower lip of the corolla 3-lobed; tube hairy within  | 23. <i>Ajuga</i>                   |
| + Lower lip of the corolla 5-lobed; tube glabrous within  | 22. <i>Teucrium</i>                |
| 7. Leaves pinnatisect or incised  | 8                                  |
| + Leaves undivided  | 9                                  |
| 8. Plant woolly; inflorescence white-fleecy   | 20. <i>Eremostachys</i>            |
| + Plant sparsely hairy, puberulent to glabrescent, or glandular-hairy; inflorescence not white-fleecy | 3. <i>Lavandula</i>                |
| 9. Leaf-margin serrate, dentate or crenate  | 10                                 |
| + Leaf-margin entire  | 21                                 |
| 10. Verticillasters 2-flowered; nutlets drupe-like  | 21. <i>Prasium</i>                 |
| + Verticillasters more than 2-flowered; nutlets not drupe-like  | 11                                 |

11. Corolla yellow, densely hairy	18. <b>Phlomis</b>
+ Corolla blue, lilac, pink, purple or white	12
12. Corolla blue or lilac	13
+ Corolla pink, purple or white	14
13. Annual 5-20 cm; corolla 1-1.2 cm, lilac; nutlets 3 x 1 mm	11. <b>Lallemantia</b>
+ Perennial 30-60 cm, woody at the base; corolla 1.5-1.8 cm, blue; nutlets 1-1.2 x 0.5 mm	10. <b>Nepeta</b>
14. Calyx funnel-shaped, with dilated scarious limb	19. <b>Otostegia</b>
+ Calyx not as above	15
15. Fruiting calyx deflexed; upper limb larger, ovate or orbicular	16
+ Fruiting calyx not deflexed	17
16. Plant strongly aromatic; stamens long-exserted; stigma 2-fid	1. <b>Ocimum</b>
+ Plant not aromatic; stamens short, included; stigma capitate	2. <b>Orthosiphon</b>
17. Calyx-teeth spiny	12. <b>Marrubium</b>
+ Calyx-teeth not spiny	18
18. Calyx-limb crenate or calyx-teeth 10-15; if 5, then broader than long	15. <b>Ballota</b>
+ Calyx-teeth 5, longer than broad	19
19. Corolla-tube short, included in the calyx	17. <b>Leucas</b>
+ Corolla-tube long, exserted from the calyx	20
20. Annual; stamens included	14. <b>Lamium</b>
+ Shrub; stamens long-exserted	16. <b>Clerodendrum</b>
21. Flowers solitary in the leaf axils	5. <b>Origanum isticum</b>
+ Flowers in heads or spike-like inflorescences	22
22. Flowers in dense heads	23
+ Flowers in spike-like inflorescences	24
23. Leaves broadly ovate	5. <b>Origanum</b>
+ Leaves linear or lanceolate	6. <b>Thymus</b>
24. Stems white-woolly; leaves stellate-tomentose	13. <b>Stachys</b>
+ Stems and leaves not as above	7. <b>Micromeria</b>

### 1. **Ocimum** L.

Annual or perennial herbs or low shrubs; strongly and pleasantly aromatic; leaves not divided, densely gland-dotted, the margin entire; inflorescence of terminal and lateral racemes; verticillasters 5-10-flowered; bracts small, deciduous; calyx campanulate, bilabiate, accrescent and deflexed in fruit, 10-nerved; corolla bilabiate; upper lip 4-lobed, the lower lip entire, spreading; stamens 4, declinate long-exserted; thecae 1-locular by fusion; style 2-fid; nutlets finely rugose, the apex rounded. 150 species, warm temperate and tropical regions, but especially Africa.

1. **Ocimum forsskaolii** Benth., Lab. Gen. Sp. 1: 6 (1832).

Syns. *Ocimum menthifolium* Hochst. ex Benth. in DC., Prodr. 12: 34 (1848).

*Ocimum hadiense* sensu Boulos, Fl. Egypt Checklist 124 (1995), non Forssk. (1775).

*Plectranthus hadiensis* sensu Boulos, Fl. Egypt Checklist 124 (1995).

Strongly aromatic low shrub, 25-60 cm; stems much-branched, woody, crisped-pubescent, brown; leaves 1.5-5 x 0.6-2.5 cm, ovate-elliptic, short white-appressed hairy, entire or obscurely serrate, subacute; petiole 0.5-1.5 cm; racemes with distant verticillasters, bracts 3 x 3.5 mm, ± orbicular; pedicel 1-2.5 mm, deflexed in fruit; calyx 3-4 mm, to 7 mm in fruit, white-hairy, the teeth acuminate; corolla 6-8 mm, pale mauve, the throat hairy; stamens long-exserted; stigma 2-fid; nutlets 1.5 x 1 mm, ovoid, brown.

GE; hillsides, stony ground. Southeast Egypt, Sudan, Somalia, Ethiopia, Kenya, Arabia.

2. **Orthosiphon** Benth.

Perennial herbs or low shrubs; indumentum eglandular; leaves undivided, crenate to serrate, sessile or petiolate; verticillasters 4-6-flowered, in terminal or lateral racemes; bracts small; flowers white, lilac or purplish; calyx accrescent and deflexed in fruit, upper tooth 1, large, recurved, with decurrent margins; 4 lower teeth, 2 long and 2 short; teeth subulate-attenuate, curved; corolla bilabiate, the upper lip 3-4 fid, the lower entire; corolla-tube exserted from calyx or not; stamens 4, declinate, included; filaments without teeth; thecae 1-locular by fusion; stigma capitate; nutlets ovoid, finely punctulate. About 40 species, Old World tropics.

1. **Orthosiphon pallidus** Royle ex Benth. in Hook., Bot. Misc. 3: 370 (1833).

White-pubescent perennial with a woody base, 10-25 cm, not aromatic; stems diffuse, erect or ascending; leaves 0.8-2 x 0.5-1.5 cm, ovate, crenate-serrate, obtuse, the base cuneate to truncate; petiole 0.3-1 cm; verticillasters 4-6-flowered, distant; bracts 0.5-1 mm; pedicel 1-2 mm, deflexed in fruit; calyx 2-2.5 mm, to 5 mm in fruit; upper calyx-tooth ovate-orbicular, the 4 lower subulate-attenuate; corolla 4-5 mm, white or lilac; stamens short, included; nutlets c. 1 x 1 mm, ovoid, brownish.

GE; hillsides, stony ground. Southeast Egypt, Sudan, tropical East Africa, Ethiopia, Somalia, Socotra, Arabia, Pakistan, India.

3. **Lavandula** L.

Literature: Upton, T.M. & Jury, S.L. 2002. A revision of native Moroccan species of *Lavandula* L. section *Pterostoechas* Ging. (Lamiaceae). Taxon 51: 309-327.

Aromatic shrubs; indumentum of short appressed stellate hairs, sometimes glandular-hairy; stems 4-angled, erect, stiff; leaves pinnatisect, incised or undivided; inflorescence spicate, simple or branched, on a long leafless peduncle; verticillasters 6-8-flowered; bracts present; flowers ± sessile; calyx tubular, 13-15-ribbed, not bilabiate; calyx-teeth short and ± equal; corolla exserted, bilabiate, yellow, blue or violet; upper lip 2-fid, the lower 3-lobed; stamens 4, included; thecae 2-locular, becoming 1-locular, bearded; style oblong to subglobose; nutlets oblong, smooth, glabrous. 30 species, Atlantic Islands, Mediterranean region to Somalia and India.



- |   |  |
|---|--|
| 1. Leaves undivided; flowers dull yellow<br>+ Leaves dissected; flowers blue  | 1. <b>L. atriplicifolia</b><br>2                     |
| 2. Spikes 2-3 x 0.8-1 cm, mostly solitary; bracts black-veined<br>+ Spikes (3-)4-10 x c. 0.4 cm, mostly in panicles; bracts not black-veined            | 2. <b>L. multifida</b><br>3                          |
| 3. Stems patent-pubescent, glandular; leaves 2-3-pinnatisect;<br>spikes dense<br>+ Stems puberulent to glabrescent; leaves 1-pinnatisect,<br>spikes lax | 3. <b>L. pubescens</b><br>4. <b>L. coronopifolia</b> |

1. **Lavandula atriplicifolia** Benth. in A. DC., Prodr. 12: 146 (1848).  
Syns. *Lavandula canescens* Defflers, Voy. Bot. Yémen 186 (1889).  
*Sabaudia atriplicifolia* (Benth.) Chiov., Boll. Soc. Bot. Ital. 6-7: 56 (1917).

Aromatic, grey-canescens low shrub, 40-80 cm; stems much-branched from the base; leaves 1.5-3.5 x 0.2-0.35 cm, oblong-linear, entire, acute or obtuse, the base cuneate; spikes 1.5-3 cm, in lax terminal panicles; bracts 4-5 mm, broadly ovate to suborbicular, membranous between the prominent veins; flowers ± regular; calyx c. 4 mm, hairy, tubular, not 2-lipped, the teeth ± equal; corolla 8-9 mm, dull yellow, 2-lipped; tube hairy outside; lobes 1.5-2 mm, linear-lanceolate, acute; nutlets not seen.

De; volcanic soil, sheltered crevices between rocks. Southeast Egypt, Saudi Arabia, Yemen.

NOTE: The type of *Lavandula atriplicifolia* was collected in Upper Egypt in 1847, Parlatore *s.n.* (K!).

2. **Lavandula multifida** L., Sp. Pl., ed. 1, 572 (1753).

Perennial 0.5-1.2 m; stems branched, erect, stiff, strongly 4-angled, densely pubescent, the internodes to 25 cm; leaves 4-8 cm, green, 2-pinnatisect, pubescent on both surfaces; lobes oblong-elliptic, acute; spikes 2-3 x 0.8-1 cm, ovoid, on long leafless peduncles, mostly solitary; bracts c. 5 x 1.5 mm, elliptic, mucronate, black-veined, white-woolly; calyx 4-5 mm, 15-veined; teeth c. 1.5 mm, white-woolly; corolla 1-1.2 cm, blue; stamens 4, included; nutlets 1.2 x 0.8 mm, broadly elliptic, smooth, yellowish-brown.

De, GE; stony ground. Southwest Portugal, western Mediterranean region, southeast Egypt.

3. **Lavandula pubescens** Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 246 (1834).

Densely glandular-pubescent perennial, woody at the base, 30-80 cm, with pleasant or sometimes acrid aroma; stems erect, stiff; branches opposite; leaves 1.5-4 cm, 2-3-pinnatisect; lobes oblong-linear, acute; spikes 3-8 cm, dense, solitary or in panicles; verticillasters 2-flowered; bracts 4 x 1.5 mm, ovate, acuminate, strongly veined; calyx 5-6 mm, cylindrical; teeth triangular, acute; corolla 1-1.2 cm, blue; stigmas ovate; nutlets 1.5 x 1 mm, ovoid, reticulate.

De, R, S; desert wadis. Egypt, Palestine, southwest Asia, northwest Africa.



Plate 2. LABIATAE: *Ocimum forsskaolii* 1, flowering and fruiting branches. *Orthosiphon pallidus* 2, flowering branch. *Lavandula atriplicifolia* 3, flowering branch. *Lavandula multifida* 4, flowering branch. *Lavandula pubescens* 5, flowering branch; flower (right); basal leaves (left). *Lavandula coronopifolia* 6, flowering branch; flower and basal leaves (right). *Mentha pulegium* 7, flowering branch. *Mentha longifolia* subsp. *typhoides* 8a, flowering branch; *Mentha longifolia* subsp. *schinzperi* 8b, flowering branch; basal clasp leaves (left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

4. **Lavandula coronopifolia** Poir. in Lam., Encycl. Suppl. 3: 308 (1813).  
Syn. *Lavandula stricta* Delile, Descr. Egypte, Hist. Nat. 238 (1814).

Like *Lavandula pubescens*, but puberulent to glabrescent; stems many; spikes to 10 cm, often interrupted below; bracts 1.5-2 mm; calyx 4-5 mm; corolla 6-8 mm, pale blue.

O (Uweinat), De, R, GE, S; calcareous ground, desert wadis. Egypt, Palestine, Arabia, Iran, Sudan, Algeria, Morocco, Cape Verde Islands.

#### 4. **Mentha** L.

Aromatic perennial herbs, usually with creeping rhizomes; leaves petiolate or sessile, usually serrate, with sessile glands; verticillasters many-flowered, axillary or terminal, in head- or spike-like inflorescences; bracteoles small or 0; flowers bisexual or female, small; calyx tubular, 10-13-veined, the teeth  $\pm$  equal; corolla  $\pm$  regular, infundibular, lilac, pink, purple or white; limb 4-lobed, the lobes  $\pm$  equal; stamens 4,  $\pm$  equal, usually exserted; filaments glabrous; style branches short, equal; nutlets ovoid, smooth or finely reticulate, rarely hairy at the tip. About 25 species, temperate regions of the Old World.

1. Plant glabrescent; verticillasters remote; bracteoles absent;  
calyx throat hairy within **1. *M. pulegium***  
+ Plant tomentose-canescens; verticillasters dense, in spike-like inflorescences;  
bracteoles present; calyx throat glabrous within **2. *M. longifolia***

#### 1. **Mentha pulegium** L., Sp. Pl., ed. 1, 577 (1753).

Glabrescent perennial 20-50 cm; stems procumbent or ascending, often purplish; leaves 1-2.5 x 0.6-1.5 cm, ovate-oblong to broadly or narrowly elliptic, obscurely serrate; petiole 2-5 mm; verticillasters 1-1.2 cm diam., remote; bracteoles absent; calyx 2.5-3 mm, tubular, pubescent; throat densely hairy, the teeth  $\pm$  equal, subulate; corolla 4.5-6 mm, lilac; stamens exserted; nutlets 0.8 mm, brownish.

N, O; canal banks, moist ground. Western and Central Europe, Mediterranean region, Arabia, Iraq, Iran.

#### 2. **Mentha longifolia** (L.) Huds., Fl. Angl., ed. 1, 221 (1762).

Syns. *Mentha spicata* L. var. *longifolia* L., Sp. Pl., ed. 1, 576 (1753).

*Mentha sylvestris* L., Sp. Pl., ed. 2, 804 (1763).

*Mentha lavandulacea* Willd., Enum. Pl. Hort. Berol. 609 (1809).

Tomentose-canescens perennial 30-80 cm; stems erect; leaves 1-6 x 0.5-1.8 cm, ovate-lanceolate or broadly to narrowly lanceolate, almost entire or sharply serrate, acute, sessile, the base rounded,  $\pm$  clasping; tomentose on both surfaces, the hairs all simple; verticillasters 3-10 cm, in terminal dense spikes; bracteoles 3-4 x 0.5-1 mm, lanceolate, pubescent; calyx c. 1.5 mm, campanulate, pubescent; teeth  $\pm$  as long as the tube, triangular; corolla c. 3 mm, pink.

Two subspecies occur in Egypt:

subsp. **typhoides** (Briq.) Harley, Notes Roy. Bot. Gard. Edinb. 38: 38 (1980).

Syn. *Mentha sylvestris* L. subsp. *typhoides* Briq., Bull. Soc. Bot. Genève 5: 90 (1889).

Leaves to 1.8 cm broad, ovate-lanceolate, sharply serrate, the base hardly clasping.

N, O, S; canal banks, ditches and pools.

subsp. **schimperii** (Briq.) Briq. in Engl. & Prantl, *Natürl. Pflanzenfam.* IV, 3a: 321 (1897).

Leaves to 8 mm broad, narrowly lanceolate, obscurely serrate to almost entire, the base clasping.

S; wet places, pools near wells.

Area of the species: Canary Islands, Europe, Mediterranean region, southwest Asia, tropical East and South Africa.

## 5. *Origanum* L.

Perennial herbs and low shrubs, pubescent or glabrous; stems many, branched, erect or ascending; leaves subsessile, elliptic, ovate or suborbicular, entire to dentate; verticillasters 2-8-flowered, in dense spike-like inflorescences, often in panicles; bracts distinct from leaves, usually imbricate; flowers bisexual; calyx  $\pm$  regular and 5-toothed or zygomorphic and 1-2-lipped, 10-13-veined, the throat usually with a ring of hairs; corolla lilac, purple, pink or white, usually  $\pm$  equally 2-lipped; upper lip emarginate or shortly 2-lobed; lower lip 3-lobed; stamens 4, the lower pair longer, exserted; filaments unequal; nutlets small, ovoid, brown. 36 species, Eurasia, Mediterranean region.

1. Flowers in terminal spikes

1. *O. syriacum*

+ Flowers solitary in the leaf axils

2. *O. isthmicum*

1. *Origanum syriacum* L., *Sp. Pl.*, ed. 1, 590 (1753) subsp. *sinaicum* (Boiss.) Greuter & Burdet, *Willdenowia* 14: 301 (1985).

Syn. *Origanum maru* L. var. *sinaicum* Boiss., *Fl. Orient.* 4: 553 (1879).

Tomentose low shrub 40-90 cm; stems erect, much-branched; leaves 0.5-1.5 x 0.4-1.2 cm, broadly ovate, entire, palmate-veined, obtuse, the base rounded; petiole 1-2 mm; verticillasters in terminal panicles of numerous dense spikes 0.5-1 cm; bracteoles 2.5 x 1.5 mm, ovate, white-canescens; calyx c. 2.5 mm; corolla 4.5-5 mm, lilac.

S; stony ground. Endemic.

NOTE: The type of *Origanum maru* var. *sinaicum* was collected on Mt Sinai, 13 June 1835, Schimper 385 (K!).

2. *Origanum isthmicum* Danin, *Israel J. Bot.* 18: 191 (1969).

Pubescent low shrub 10-50 cm; stems erect, much-branched; leaves 4-7 x 4-7 mm, broadly ovate, entire, palmate-veined, obtuse, the base rounded, subsessile; flowers solitary in the leaf axils; calyx 1.5-2 mm, shortly tubular, villose; teeth 5, equal, triangular-subulate; corolla 3 mm, exserted, sub-bilabiate; lower lobe 0.8 mm, the upper 1 mm; stamens hardly exserted; nutlets 1 mm.

S (Halal Mountain); hard limestone cliffs. Sinai, Palestine.

NOTE: The type of *Origanum isthmicum* was collected in northern Sinai, 55 km southeast of El-Arish, Gebel Halal, Wadi Abu Seiyal, 500 m, in crevices of hard limestone, 18 June 1968, A. Danin (HUJ!).

## 6. *Thymus* L.

Shrubs or perennials with woody base; leaves entire, sessile or petiolate, the margin flat, revolute or thickened; leaves, bracts and calyx with sessile, usually red oil glands; verticillasters 2- to many-flowered, subtended by floral leaves, or in terminal heads with differentiated bracts; bracteoles minute; calyx distinctly bilabiate, 10-13-veined, bearded at the throat; upper lip 3-toothed, usually recurved; lower teeth subulate, curved upwards; corolla purple, pink, cream or white; stamens 4, exserted; nutlets glabrous. About 350 species, temperate Eurasia, North Africa.

- |  |                         |
|--|-------------------------|
| 1. Leaves hairy on both surfaces; flowers white                    | 3. <i>T. decussatus</i> |
| + Leaves glabrous, or ciliate at the base; flowers purple or mauve | 2                       |
| 2. Leaves keeled, linear   | 1. <i>T. capitatus</i>  |
| + Leaves not keeled, lanceolate, with revolute margin              | 2. <i>T. bovei</i>      |

1. *Thymus capitatus* (L.) Link, Fl. Port. 1: 123 (1809).

Syns. *Satureja capitata* L., Sp. Pl., ed. 1, 568 (1753).

*Coridothymus capitatus* (L.) Rchb.f., Österr. Bot. Wochenbl. 7: 161 (1857).

Low shrub 20-60 cm; stems much-branched, compact; old branches stiff, spinescent, whitish; leaves 3-8 x 0.5-1 mm, linear, keeled and boat-shaped, gland-dotted, ciliate at the base, sessile; flowers in ovoid heads 0.6-1.2 cm; bracteoles 5-6 x 1.5 mm, ovate, the margins ciliate; calyx 4-5 mm, bilabiate, 13-veined; upper lip with 3 triangular teeth, the lower 2-fid, with subulate teeth; corolla 0.8-1 cm, bilabiate, purplish-mauve, with red glandular dots outside, exserted; stamens exserted; style branches equal.

M; calcareous hills. Mediterranean region.

NOTE: Morales, Anal. Jard. Bot. Madrid 44(2): 349-380 (1987), places this species, formerly treated either in *Thymus* or in *Coridothymus*, within *Thymbra* (*Thymbra capitata* (L.) Cav.)

2. *Thymus bovei* Benth., Lab. Gen. Sp. 342 (1834).

Aromatic low shrub 15-30 cm; stems much-branched; branches rigid, erect, white-villous; leaves 0.4-1.2 x 0.2-0.4 cm, lanceolate, obtuse or acute, tapering at the base, revolute, leathery, glabrous; floral leaves 4-8 x 3 mm, ovate-elliptic; verticillasters in spike-like inflorescences 1-2 cm; bracteoles minute, subulate, ciliate; calyx c. 4 mm; corolla 7-8 mm, mauve, hairy, with red glandular dots; tube included; stamens slightly exserted.

De, S; calcareous wadi beds. Egypt, Palestine, Arabia.

NOTE: The type of *Thymus bovei* was collected in the desert between Suez and Gaza, June 1832, Bové 68 (K!).

3. **Thymus decussatus** Benth., Lab. Gen. Sp. 342 (1834).

Pubescent low shrub 20-40 cm; stems many, branched; leaves 2-7 x 0.5-1 mm, linear, decussate, keeled, hairy on both surfaces, acute, gland-dotted, sessile; flowers 0.5-1 cm, in terminal heads; calyx 3-4 mm; calyx-lobes pectinate; corolla 5-6 mm, tube included, the limb exserted; stamens slightly exserted.

S; stony ground. Sinai, northwest Saudi Arabia.

NOTE: The type of *Thymus decussatus* was collected in Sinai, June 1832, Bové 67 (K!).

7. **Micromeria** Benth., nom. conserv.

Perennials with woody base, rarely annuals; leaves entire, flat or the margins revolute, petiolate, gland-dotted; flowers in verticillasters; calyx tubular or campanulate, regular of 5 equal teeth or slightly bilabiate, the throat bearded or not; corolla bilabiate, purple, mauve or white, the lower lip 3-lobed; stamens 4, usually inserted, curved, convergent; style branches equal or unequal, subulate; nutlets glabrous or minutely puberulent, ovate. 30 species, temperate and warm regions.

1. Plant c. 10 cm, cushion-like; stems villous 1. **M. serbaliana**  
+ Plant over 10 cm; stems appressed-hairy 2

2. Hairs on calyx longer than the diameter of calyx-tube;  
calyx-teeth  $\frac{1}{2}$  or more as long as the calyx-tube 4. **M. nervosa**  
+ Hairs on calyx much shorter; calyx-teeth less than  $\frac{1}{2}$  as long as the calyx-tube 3

3. Corolla white, tinted purplish inside 3. **M. imbricata**  
+ Corolla purplish-pink 4

4. Verticillasters dense; flowers sessile or subsessile;  
bracteoles 2-3.5 mm 5. **M. myrtifolia**  
+ Verticillasters lax; flowers pedicellate; bracteoles 1-2 mm 2. **M. sinaica**

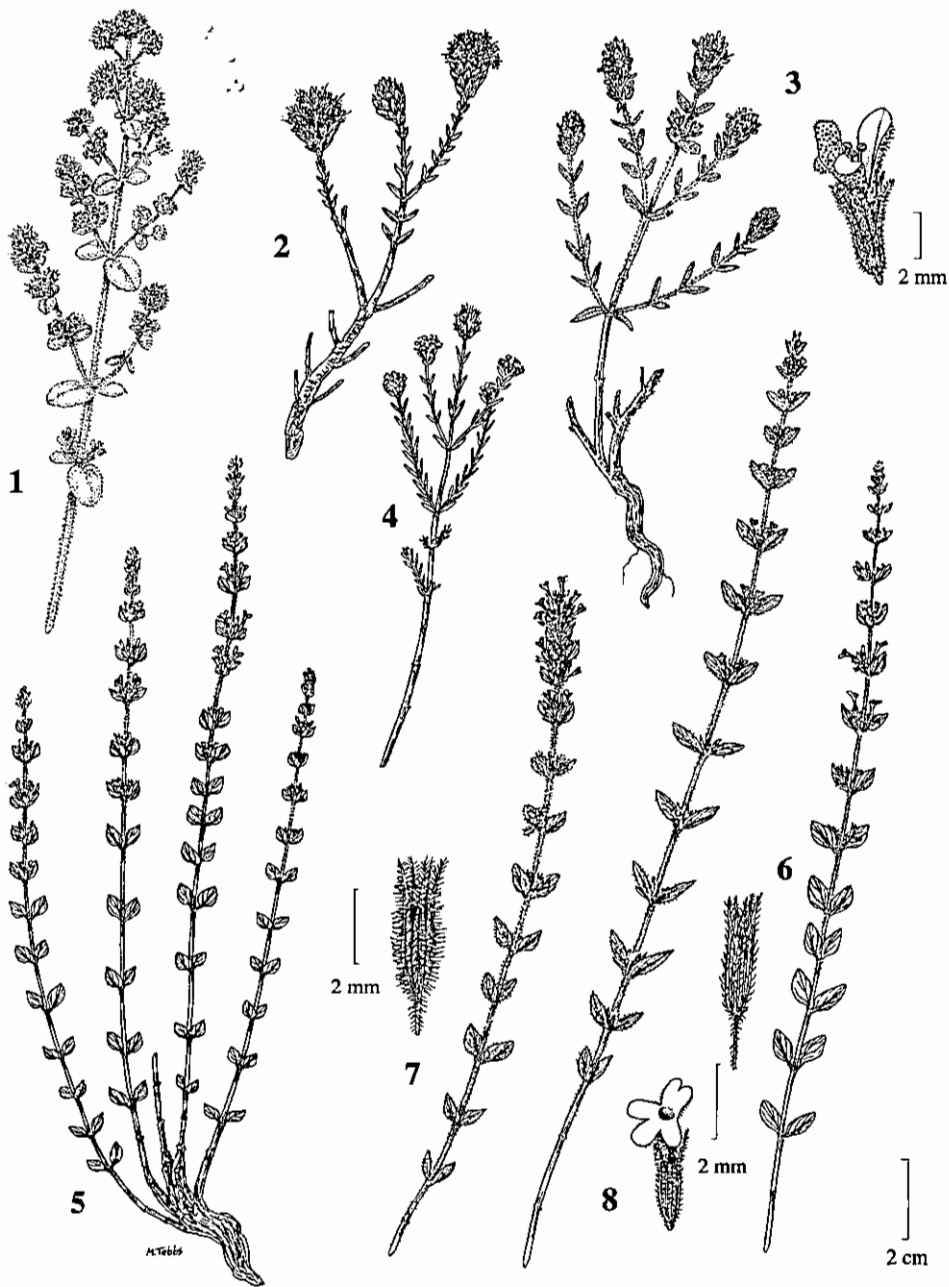
1. **Micromeria serbaliana** Danin & Hedge, Notes Roy. Bot. Gard. Edinb. 32: 261 (1973).  
Syn. *Satureja serbaliana* (Danin & Hedge) Greuter & Burdet, Willdenowia 14:  
305 (1985).

Cushion-forming perennial c. 10 cm; stems woody at the base, villous; leaves 2-3 x 1.5-2 mm, ovate, acute; margin revolute, hispid, the base rounded; hairs 1-2-celled or glandular; verticillasters 2-20-flowered; calyx c. 2.5 mm, hispid, glandular-hairy; calyx-tube 2 mm; calyx-teeth 5, subequal, 0.5 mm, triangular; corolla c. 4 mm, purple; nutlets 0.8 x 0.2 mm, ovoid to ellipsoid.

S; sheltered mountain fissures. Endemic.

NOTE: The type of *Micromeria serbaliana* was collected in Sinai, Gebel Serbal, cliffs of smooth red granite, 1850 m, 6 Aug. 1968, A. Danin (HJU, E).

2. **Micromeria sinaica** Benth., Lab. Gen. Sp. 380 (1834).  
Syn. *Satureja sinaica* (Benth.) Briq. in Engl. & Prantl, Natürl. Pflanzenfam. IV (3  
a): 299 (1896).



**Plate 3. LABIATAE:** *Origanum syriacum* subsp. *sinaicum* 1, flowering branch. *Thymus capitatus* 2, flowering branch. *Thymus bovei* 3, flowering branch; flower (right). *Thymus decussatus* 4, flowering branch. *Micromeria sinaica* 5, flowering branches. *Micromeria imbricata* 6, flowering branch; calyx (left). *Micromeria nervosa* 7, flowering branch; calyx (left). *Micromeria myrtifolia* 8, flowering branch; flower (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

Perennial with a woody base, 15-40 cm; stems erect, numerous, branched, appressed-puberulent; leaves 3-8 x 2-4 mm, broadly ovate to elliptic, subacute, slightly revolute, the base rounded; petiole 0.5-1.5 mm; verticillasters 4-20-flowered, lax, in spike-like inflorescences; bracteoles 1-2 mm, subulate; flowers pedicellate; calyx 2-3 mm, tubular, often purplish, the throat hispid, calyx-teeth 0.5-1.2 mm; corolla 5-6 mm, purplish-pink, hairy outside, the tube exserted; nutlets 1 x 0.2-0.3 mm, ellipsoid.

S; sheltered rocky fissures. Sinai, southern Palestine.

NOTE: The type of *Micromeria sinaica* was collected in Sinai, Schimper 265.

3. **Micromeria imbricata** (Forssk.) C. Chr., Dansk Bot. Arkiv 4 (3): 21 (1922).

Syns. *Thymus imbricatus* Forssk., Fl. Aegypt.-Arab. 108 (1775).

*Thymus biflorus* Buch.-Ham. ex D. Don, Prodr. Fl. Nepal. 112 (1825).

*Micromeria biflora* (Buch.-Ham. ex D. Don) Benth., Lab. Gen. Sp. 378 (1834).

*Satureja imbricata* (Forssk.) Briq. in Engl. & Prantl, Pflanzenfam. IV, 3 A: 299 (1896).

*Satureja biflora* (Buch.-Ham. ex D. Don) Briq. in Engl. & Prantl, Pflanzenfam. IV (3 a): 299 (1896).

Fragrant glabrescent to hirsute perennial, woody at the base, 10-30 cm; stems ascending or erect, with spreading or retrorse hairs; leaves 0.4-1 x 2.5-5 mm, broadly or narrowly ovate, acute, sparsely covered with short hairs, the margins thickened, the base rounded; petiole 0-1 mm; verticillasters lax, few-flowered; pedicel 1-3 mm; calyx 3-4 mm, tubular, prominently veined, with spreading hairs; calyx-teeth  $\frac{1}{2}$  as long as the tube, triangular-subulate; throat bearded; corolla 6-7 mm, white, tinted purplish inside, the lower lip longer than the upper; stamens included; nutlets 0.8 x 0.4 mm, ellipsoid.

GE; rocky hillsides. Southeast Egypt, Arabia, Afghanistan, Pakistan, northwest India, Bhutan, China.

4. **Micromeria nervosa** (Desf.) Benth., Lab. Gen. Sp. 376 (1834).

Syns. *Satureja nervosa* Desf., Fl. Atlant. 2: 9, t. 121, f. 2 (1798).

*Satureja plumosa* Hampe, Flora (Regensburg) 25 (1): 127 (1842).

Perennial with woody base, 10-25 cm; stems erect or ascending, branched; leaves 0.5-1 x 0.3-0.5 cm, ovate, acute, hairy on both surfaces, the margins thickened, the base rounded; petiole 0.5-1.2 mm; verticillasters usually many-flowered, on peduncles 2-3 mm; pedicel 0.5-1 mm; calyx c. 3 mm, with hairs longer than the diameter of calyx-tube; calyx-teeth  $\frac{1}{2}$  or more as long as the tube, subulate; throat bearded; corolla 5-6 mm, pink or purplish; nutlets 0.6-0.8 x 0.3-0.4 mm, ellipsoid, obtuse.

M, S; rocky ground. Mediterranean region, Sinai.

5. **Micromeria myrtifolia** Boiss. & Hohen. in Boiss., Diagn. Pl. Orient., ser. 1, 5: 19 (1844).

Syn. *Satureja myrtifolia* (Boiss. & Hohen.) Greuter & Burdet, Willdenowia 14: 305 (1985).



Hirsute perennial 20-45 cm; stems many from the woody base; leaves 0.5-1 x 0.3-0.6 mm, ovate to elliptic, subacute, the margins thickened, the base rounded or attenuate; petiole c. 1 mm; verticillasters dense, many-flowered; flowers sessile or subsessile; bracteoles 2-3.5 mm, linear-subulate; calyx 3-3.5 mm, cylindrical, short-hispidulous; calyx-teeth subequal; throat bearded; corolla 4-5 mm, purplish-pink; nutlets 0.8 x 0.3 mm, oblong-ellipsoid.

S; stony ground. Sinai, Cyprus, Greece, Turkey, Syria, Iraq, Iran.

### 8. *Ziziphora* L.

Annual or perennial herbs, strongly aromatic; leaves simple, entire, ovate to oblong; verticillasters distant or crowded, many-flowered, in capitate or spike-like inflorescences; calyx narrowly tubular, straight, 9-veined; throat hairy, slightly bilabiate; corolla bilabiate, upper lip entire or emarginate, the lower 3-lobed; corolla-tube  $\pm$  included in the calyx; fertile stamens 2, included in female flowers, exerted in male flowers; staminodes present; nutlets narrowly ovoid, smooth. 25 species, Mediterranean region to Afghanistan and Central Asia.

- |  |                       |
|--|-----------------------|
| 1. Floral leaves rhombic-ovate; verticillasters in terminal heads                                    | 1. <i>Z. capitata</i> |
| + Floral leaves narrowly lanceolate to linear; verticillasters in elongate spike-like inflorescences | 2. <i>Z. tenuior</i>  |

#### 1. *Ziziphora capitata* L., Sp. Pl., ed. 1, 21 (1753).

Hispid annual 3-12 cm; stems simple or branched; lower leaves 1-2.5 x 0.5-0.8 cm, linear lanceolate to elliptic, short-petiolate; upper floral leaves rhombic-ovate; inflorescence a globose terminal head, subtended by rhombic-ovate bracts (floral leaves); flowers  $\pm$  sessile; calyx 0.8-1 cm, pilose to hispid; corolla 1-1.3 cm, violet, purple or pink; limb short, corolla-tube exerted.

S; wadi beds, sandy soil. Sinai, Palestine, Lebanon, Syria, Turkey, Cyprus, Balkans, southern Russia, Caucasus, northern Iraq, Iran.

#### 2. *Ziziphora tenuior* L., Sp. Pl., ed. 1, 21 (1753).

Hispid annual 5-15 cm; stems simple or branched; leaves 1-2 x 0.2-0.3 cm, linear-lanceolate to linear, acuminate; verticillasters in dense elongate terminal spike-like inflorescences; bracts equalling or longer than the leaves, linear; calyx 6-8 mm; corolla 0.8-1 cm, mauve or lilac; corolla-tube included in the calyx, the limb slightly expanded; nutlets 1.5 x 0.8 mm, narrowly ovoid, attenuate at the apex, yellowish-brown.

S; rocky wadi beds. Southwest and Central Asia, southern Russia, Caucasus.

### 9. *Salvia* L.

Perennials, low shrubs, or sometimes annuals, often strongly aromatic; leaves entire or variously divided; verticillasters 2-10-flowered, rarely with more flowers; calyx campanulate, infundibular or tubular, bilabiate; upper lip 3-dentate, the lower 2-dentate; calyx expanded in fruit; corolla white, yellow, pink, blue or violet, bilabiate; upper lip straight, the lower 3-lobed, with a broad concave middle lobe and 2 small lateral lobes; tube straight or curved; stamens 2, with a short filament and a connective bearing at the

upper end a fertile theca, and at the lower end a smaller fertile or subfertile theca; staminodes small; nutlets ovoid, trigonous or subglobose, glabrous. About 900 species, tropical to temperate regions, but especially America, Sino-Himalaya and southwest Asia.

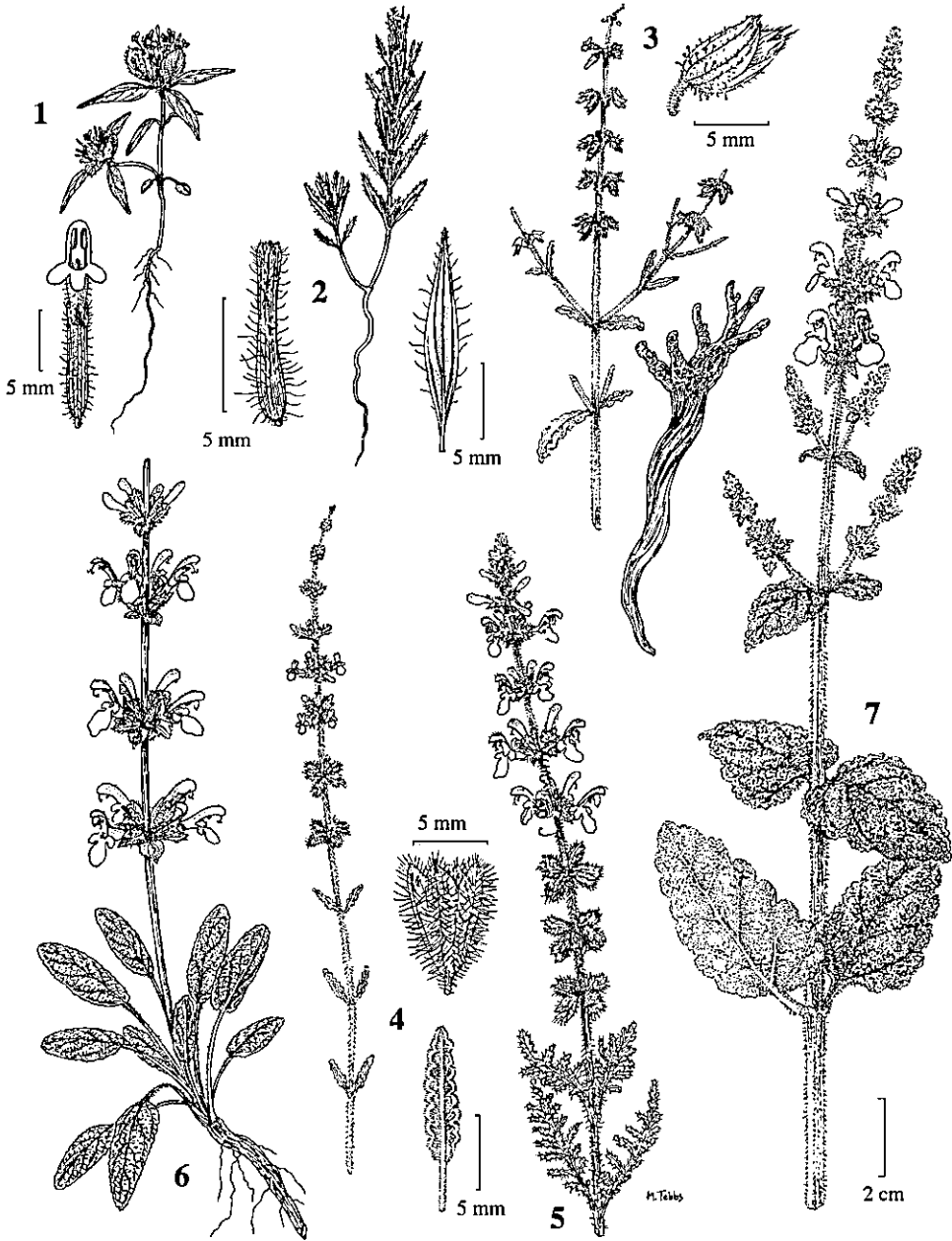
- |   |                          |
|---|--------------------------|
| 1. Leaves 2-8 mm broad  | 2                        |
| + Leaves more than 1 cm broad   | 3                        |
| 2. Leaves tapering to a short petiole; stems appressed-hairy; calyx glandular-hairy                               | 1. <b>S. aegyptiaca</b>  |
| + Leaves distinctly petiolate; stems and calyx densely white-villous  | 2. <b>S. deserti</b>     |
| 3. Leaves pinnatisect; lobes very narrow, linear  | 3. <b>S. lanigera</b>    |
| + Leaves not lobed or irregularly lobed; lobes (if present) 1 cm or more broad                                    | 4                        |
| 4. Calyx bilabiate, membranous, 2-2.5 cm broad in fruit   | 4. <b>S. multicaulis</b> |
| + Calyx not as above  | 5                        |
| 5. Calyx-teeth unarmed  | 6                        |
| + Calyx-teeth spiny-tipped  | 7                        |
| 6. Calyx 0.8-1 cm, obconical-campanulate; corolla 1.5-2 cm, white to yellowish-cream                              | 5. <b>S. dominica</b>    |
| + Calyx 5-7 mm, expanding to 0.8-1 cm and nodding in fruit, ovate-campanulate; corolla 1-1.2 cm, blue to lavender | 6. <b>S. verbenaca</b>   |
| 7. Corolla purplish-pink or bluish  | 7. <b>S. sclarea</b>     |
| + Corolla white   | 8                        |
| 8. Leaves broadly ovate, undivided  | 8. <b>S. spinosa</b>     |
| + Leaves irregularly pinnate-lobed, with 1-2 pairs of segments at the base  | 9. <b>S. palaestina</b>  |

1. **Salvia aegyptiaca** L., Sp. Pl., ed. 1, 23 (1753).  
 Syn. *Salvia pumila* Benth., Lab. Gen. Sp. 726 (1834).

Scabrid-pubescent low shrub, 15-40 cm; stems erect or ascending, stiff, much-branched; appressed-hairy; leaves 1-2.5 x 0.2-0.5 cm, oblong-linear, acute, serrate-crenate, revolute, tapering to a short petiole; floral leaves and bracteoles minute, persistent; verticillasters 2-5-flowered, remote, in spike-like inflorescences; pedicel 1-3 mm, curved; flowers nodding; calyx 3-4 mm, to 7 mm in fruit, glandular-hairy, 2-lipped, the upper lip recurved at the apex; corolla 5.5-7 mm, pale blue, the upper lip shorter than the lower; nutlets 1.8 x 0.8 mm, ovoid-ellipsoid, smooth, black.

M, D, R, GE, S; desert wadis and plains. Cape Verde and Canary Islands, North Africa, Sudan, Ethiopia, Arabia, Iraq, Iran, Afghanistan, Pakistan, India.

NOTE: The type of *Salvia aegyptiaca* was grown in Hort. Cliff. from seeds collected in Egypt (BM).



**Plate 4. LABIATAE:** *Ziziphora capitata* 1, habit; flower (left). *Ziziphora tenuior* 2, habit; leaf (right); calyx (left). *Salvia aegyptiaca* 3, flowering and fruiting branch; fruiting calyx (up right); woody base (down right). *Salvia deserti* 4, flowering and fruiting branch; fruiting calyx and leaf (right). *Salvia lanigera* 5, flowering and fruiting branch. *Salvia multicaulis* 6, habit. *Salvia dominica* 7, flowering branch. All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

2. **Salvia deserti** Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 248 (1834).

Like *Salvia aegyptiaca*, but stems and calyx densely white-villous; leaves distinctly petiolate; flowers subsessile; calyx 5 mm in flower, 7 mm in fruit, calyx-lips  $\pm$  equal.

De, S; desert wadis. Egypt, southern Palestine, Arabia.

3. **Salvia lanigera** Poir. in Lam., Encycl. Suppl. 5: 49 (1817).

Strongly aromatic perennial, 20-40 cm, with spreading white hairs; stems much-branched; leaves 2-8 cm, pinnatisect; lobes linear, obtuse, crenulate-revolute; bracts 3-5 mm, ovate-orbicular; verticillasters 5-8-flowered; calyx 4-5 mm in flower, 0.8-1 cm in fruit, white-hairy, upper lip minutely 3-dentate; corolla c. 1 cm, deep violet, corolla-tube long-exserted; nutlets c. 2.2 x 1.6 mm, ovoid, smooth, black.

M, D, S; desert wadis and sandy plains. Cyprus, North Africa, Sinai, Palestine, Lebanon, Syria, Arabia, Iraq, Iran.

4. **Salvia multicaulis** Vahl, Enum. Pl. 1: 225 (1804).

Syns. *Salvia acetabulosa* sensu Täckh., Stud. Fl. Egypt, ed. 2, 462 (1974).

*Salvia pinardii* sensu Täckh., Stud. Fl. Egypt, ed. 2, 462 (1974).

Perennial with a woody base, 15-40 cm; stems many, erect, unbranched, glandular-villous to glabrescent; leaves 2-5 x 1-2.5 cm, simple, ovate-elliptic, crenulate, densely covered with dendroid-stellate hairs; petiole 0.8-2.5 cm; verticillasters 4-8-flowered, remote; bracts 1.5 x 1 cm, broadly ovate; bracteoles present; pedicel 2-3 mm; calyx 1-1.2 cm, campanulate, bilabiate, membranous and broadening to 2-2.5 cm in fruit, glandular-hairy; corolla 1.5-1.8 cm, purplish-violet; nutlets 3.5 x 2.5 mm, rounded-triangular, brown.

S; stony ground at high altitudes, Sinai, Palestine, Lebanon, Syria, Turkey.

5. **Salvia dominica** L., Sp. Pl., ed. 1, 25 (1753).

Syn. *Salvia graveolens* Vahl, Enum. Pl. 1: 273 (1804).

Aromatic perennial 30-80 cm, with spreading white hairs, woody at the base; stems erect or ascending; leaves 3-6 x 1.5-3 cm, ovate, appressed-canescens, crenate-dentate, obtuse or acute, the base cordate or truncate; petiole 0.3-1.2 cm; upper leaves sessile; floral leaves c. 1.5 x 0.5 cm, cordate-lanceolate, acuminate, glabrous on the upper surface; bracteoles 5-8 mm; verticillasters 4-6-flowered, in long racemes; calyx 0.8-1 cm, obconical-campanulate, densely covered with white hairs and sessile glands; corolla 1.5-2 cm, white to yellowish-cream.

S; hillsides. Sinai, Palestine, Lebanon, Syria, Cyprus.

6. **Salvia verbenaca** L., Sp. Pl., ed. 1, 25 (1753).

Perennial 20-50 cm, short-pubescent below, villose and glandular-hairy above; stems numerous, ascending; leaves 2-6 x 1.2-2 cm, almost glabrous, oblong-ovate, crenate or lobed, obtuse, the base rounded; petiole 1-4 cm; upper leaves sessile, clasping; floral leaves lanceolate, acuminate; verticillasters 4-6-flowered, remote or crowded; calyx 5-7

mm, in fruit 0.8-1 cm and nodding, ovate-campanulate; corolla 1-1.2 cm, blue to lavender; nutlets 1.5 x 1 mm, ovoid, smooth, brown.

M, De; roadsides, edges of cultivation. Canary Islands, Madeira, western Europe to Scotland, Mediterranean region, Transcaucasus, Iraq, Iran; naturalized in America, South Africa and Australia.

**7. *Salvia sclarea* L., Sp. Pl., ed. 1, 27 (1753).**

Aromatic perennial 30-80 cm, covered with short white hairs; stems erect; leaves 7-15 x 6-12 cm, broadly ovate, acute, crenate-dentate, the base cordate; petiole 4-8 cm, the uppermost leaves sessile; bracteoles 1.5-2.5 x 1-1.5 cm, ovate, acuminate, pink to mauve; verticillasters 2-5-flowered; pedicel 1-3 mm; calyx c. 1 cm, to 1.4 cm in fruit, with sessile glands; corolla 2-3 cm, purplish-pink or bluish; nutlets 3 x 2 mm, rounded-trigonal.

S; wet ground, field borders. Europe, southwest and Central Asia.

**8. *Salvia spinosa* L., Mant. Alt. 511 (1771).**

Perennial 25-70 cm, glandular-hairy and viscid, especially above; stems erect; leaves 5-10(-18) x 3-8(-15) cm, broadly ovate, undivided, obtuse, dentate, the base cordate; petiole 5-10 cm, the upper leaves sessile; floral leaves 2-3 cm, broadly ovate-cordate, clasping; bracteoles 1-1.5 x 1 cm, cordate, acuminate, glandular-hairy; verticillasters 2-6-flowered, remote; pedicel 1-2 mm; calyx 1.5-2 cm, to 2.5 cm in fruit, tubular, glandular-hairy; calyx-teeth long-aristate and spinulose; corolla 1.8-2.2 cm, white; nutlets c. 3 x 2.5 mm, rounded-trigonal.

M, S; roadsides, edges of fields. Egypt, Southwest Asia.

**9. *Salvia palaestina* Benth., Lab. Gen. Sp. 718 (1835).**

Like *Salvia spinosa*, but leaves smaller, irregularly pinnately-lobed, with 1-2 pairs of segments at the base; bracteoles almost glabrous; calyx-teeth cuspidate, prickly.

De, S; edges of cultivated fields. Egypt, Palestine, Turkey, northern Iraq, Iran.

**10. *Nepeta* L.**

Perennials or annuals, often aromatic; leaves usually simple, rarely pinnatisect; verticillasters remote or crowded into spike-like or ovoid heads; flowers bisexual or male; calyx tubular, 15-veined, bilabiate, ± the same in fruit; corolla bilabiate, blue, violet, pink, yellow or white; tube straight or curved, included in the calyx or exerted; stamens 4, divergent or declinate, the posterior pair longer than the anterior, or if ascending under the upper lip of the corolla, then the posterior pair shorter than the anterior; style unequally 2-lobed; nutlets ellipsoid to obovoid, smooth or tuberculate. About 250 species, temperate Eurasia, North Africa, tropical African mountains.

**1. *Nepeta septemcrenata* Benth., Lab. Gen. Sp. 484 (1834).**

Appressed-tomentose perennial 30-60 cm, woody at the base; stems many, erect, branched; leaves 1-2.5 x 1-1.8 cm, ovate-deltoid, obtuse, crenate, the base cordate;

petiole 2-8 mm; verticillasters remote, 3-8-flowered on a peduncle 3-6 mm; pedicel 1-2 mm; calyx 6-8 mm, tubular, prominently 15-veined, glandular-hairy; calyx-teeth acute; corolla 1.5-1.8 cm, blue, corolla-tube narrow; stamens exserted; nutlets 1-1.2 x 0.5 mm, tuberculate.

S; stony wadis. Sinai, northwest Saudi Arabia.

NOTE: The type of *Nepeta septemcrenata* was collected in Egypt "in desertis Aegypti" by Ehrenberg.

### 11. *Lallemantia* Fisch. & Mey.

Annuals or perennials; verticillasters subtended by floral leaves, 3-6-flowered, remote, in spike-like inflorescences; bracteoles prominently veined, aristate-dentate; calyx tubular, 15-veined, slightly 2-lipped; corolla tubular, 2-lipped, the lower lip 3-lobed; stamens 4, ascending under the upper lip of the corolla, the posterior pair longer than the anterior; thecae divergent; style-lobes unequal; nutlets 3-angled, smooth or punctate. 5 species, Turkey to Central Asia and Himalayas.

1. *Lallemantia royleana* (Benth.) Benth. in A. DC., Prodr. 12: 404 (1848).

Syn. *Dracocephalum royleanum* Benth. in Wall., Pl. Asiat. Rar. 1: 65 (1830).

Appressed-pubescent annual 5-20 cm; stems few, erect or ascending; leaves 1-3 x 0.5-1 cm, ovate to elliptic, dentate-crenate, subacute, the base attenuate; lower leaves petiolate, the upper sessile; verticillasters 3-6-flowered; bracteoles 1.2-1.6 x 2-3 mm, flabellate-cuneate, with long aristate teeth; pedicel 1-2.5 mm, markedly flattened, ± as broad as the calyx; calyx 7-8 mm, prominently 15-veined, pubescent; corolla 1-1.2 cm, lilac; stamens ascending under the upper lip of the corolla, the posterior pair longer than the anterior; nutlets 3 x 1 mm, trigonous, with a small attachment scar, finely tuberculate, black.

S; sheltered crevices in the mountains. Southern Russia, Sinai, Saudi Arabia, southwest and Central Asia, western China.

### 12. *Marrubium* L.

Perennials or annuals; indumentum of simple or stellate hairs; leaves undivided, serrate-crenate, not lobed; verticillasters many-flowered, dense, remote, in the axils of upper leaves; bracteoles subulate; flowers sessile; calyx tubular, the teeth 5 to 10, with recurved hooked tips in fruit; corolla white or cream, short, bilabiate; corolla-tube straight, slightly exserted or included; stamens 4, didynamous, included; thecae 2-locular, divergent; style with 2 unequal short lobes; nutlets trigonous, smooth. 30 species, Mediterranean region, Asia.

1. Calyx-teeth 5; corolla pale pink

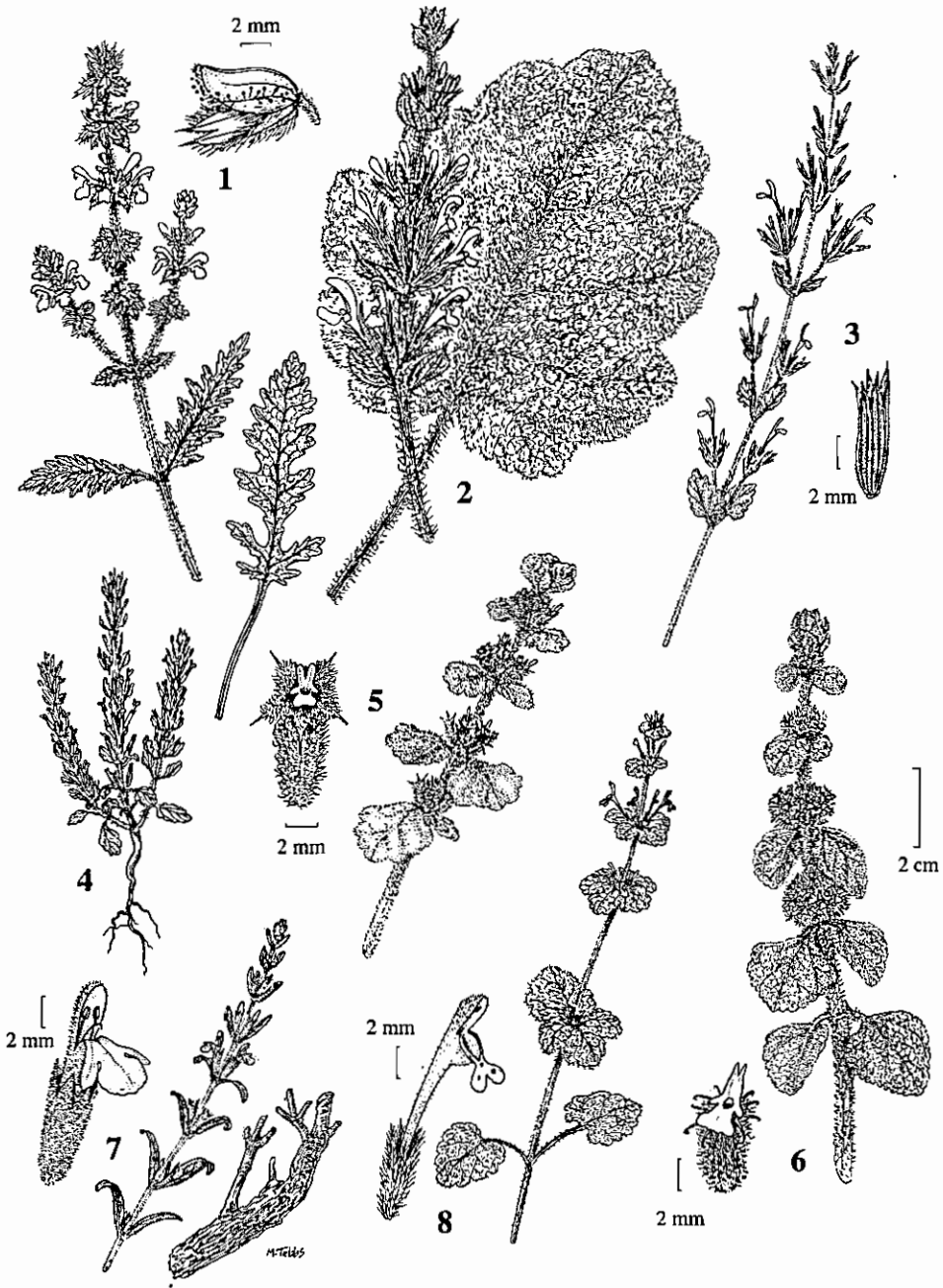
+ Calyx-teeth 10; corolla white

1. *M. alysson*

2. *M. vulgare*

1. *Marrubium alysson* L., Sp. Pl., ed. 1, 582 (1753).

Canescent annual or short-lived perennial, 20-50 cm; stems ascending, branched, densely white-cottony; leaves 1-3 x 2-4 cm, grey-tomentose, fan-shaped, broader than long, rounded, the base cuneate; petiole 0.5-1 cm; upper leaves sessile; verticillasters



**Plate 5. LABIATAE:** *Salvia verbenaca* 1; fruiting calyx (up right); basal leaf (down right). *Salvia spinosa* 2, flowering branch and basal leaf. *Nepeta septemcrenata* 3, flowering branch; fruiting calyx (right). *Lallemantia royleana* 4, habit. *Marrubium alysson* 5, flowering branch; flower (left). *Marrubium vulgare* 6, flowering branch; flower, (down left). *Stachys aegyptiaca* 7, flowering branch; woody base (right); flower (left). *Lamium amplexicaule* 8, flowering branch; flower (left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

10-15-flowered, remote; bracteoles minute; calyx 7-9 mm, 10-veined, white-woolly; throat densely woolly; calyx-teeth 5, 2-3 mm, spiny-tipped, spreading in fruit; corolla pale pink; limb short, hairy outside; upper lip 2-fid; nutlets 2 x 1 mm, trigonous, brown.

M, D, S; roadsides, waste ground, edges of cultivation. Mediterranean region, Sinai.

**2. *Marrubium vulgare* L., Sp. Pl., ed. 1, 583 (1753).**

Like *Marrubium alysson*, but perennial; stems numerous; calyx-teeth 10; corolla white.

M, S; roadsides, waste ground, edges of cultivation. Europe, Caucasia, Mediterranean region, Sinai, Arabia, Iraq, Iran, Pakistan; naturalized in North America, South Africa and Australia.

**13. *Stachys* L.**

Perennials, annuals or low shrubs, with simple or stellate-dendroid hairs; leaves entire, crenate, dentate or lobed; verticillasters 2-20-flowered, in the axils of upper leaves; bracteoles herbaceous or spiny; calyx tubular or campanulate, regular or slightly bilabiate, 5-10-nerved; throat bearded; calyx-teeth 5,  $\pm$  equal; corolla white, pink or purple, bilabiate, longer than the calyx, the upper lip erect; stamens 4, didynamous, included under the upper lip of corolla or within the corolla-tube; thecae 2-locular, spreading; style with 2 short subequal short lobes; nutlets trigonous. About 300 species, temperate and warm regions excluding Australasia and tropical mountains.

**1. *Stachys aegyptiaca* Pers., Syn. Pl. 2: 124 (1806).**

Perennial with woody base, 20-60 cm, densely stellate-tomentose; stems much-branched,  $\pm$  terete; leaves 0.5-2 x 0.3-0.6 cm, oblong-lanceolate to elliptic, subacute, entire, the base tapering to a short petiole; veins immersed on the upper surface, elevated on the lower; floral leaves sessile, exceeding the calyx; verticillasters 2-4-flowered, in lax raceme-like inflorescences; bracteoles minute; flowers sessile; calyx 5-7 mm, tubular-campanulate, densely stellate-tomentose; calyx-teeth 1-1.5 mm, triangular; corolla pink, hairy outside; nutlets 2.5 x 1.2 mm, ovoid-trigonous, smooth, black.

De, S; stony wadis. Egypt, Palestine, northwest Saudi Arabia.

NOTE: The type of *Stachys aegyptiaca* was collected in Egypt, Herb. Juss. (P).

**14. *Lamium* L.**

Annuals or perennials; verticillasters many-flowered; bracteoles few or absent; calyx 5-veined, 5-dentate, with teeth equal or the posterior tooth longer; corolla bilabiate; tube exerted, dilated at the throat; upper lip concave, the lower spreading; stamens 4, didynamous, included; thecae long-hairy on the outer side; style branches  $\pm$  equal; nutlets  $\pm$  trigonous, verrucose or smooth. About 40 species, North Africa, Eurasia.

**1. *Lamium amplexicaule* L., Sp. Pl., ed. 1, 579 (1753).**

Annual 10-30 cm, sparsely hairy; stems many, ascending; leaves 1-2.5 x 1.2 cm, orbicular-ovate, crenate, rounded, the base cordate; petiole 1-3 cm, lower leaves with



longer petioles than the upper; bracts 1-2 x 1.2-3 cm, sessile, clasping; bracteoles absent; calyx 5-7 mm, tubular; calyx-teeth shorter than the tube, lanceolate-subulate; corolla 1.2-1.8 cm, purple, pubescent outside; stamens included; nutlets 2-2.5 mm, smooth, dark brown.

N, O, M, S; weed of cultivation. North Africa, temperate Eurasia.

### 15. *Ballota* L.

Perennials or low shrubs; leaves crenate or dentate; verticillasters many-flowered in spike-like inflorescences; bracteoles sometimes prickly or minute; calyx tubular, obconical infundibular, 10-veined, often with a dilated spreading limb, 5-10-dentate or irregularly crenate or dentate; corolla bilabiate, pink, purple or white; tube included or slightly exerted, with a ring of hairs inside; upper lip erect, densely hairy; lower lip spreading; stamens 4, didynamous, ascending under the upper lip; style branches equal, subulate; nutlets oblong-ovoid, smooth. 35 species, Mediterranean region, western Asia.

- |   |                              |
|---|------------------------------|
| 1. Stems densely white-woolly   | 2                            |
| + Stems green   | 3                            |
| 2. Leaves greyish-green, tomentose, reniform or ± orbicular, broader than long, margins conspicuously crenate     | 1. <i>B. damascena</i>       |
| + Leaves yellowish, with densely felted indumentum, broadly cordate, longer than broad, margins obscurely crenate | 2. <i>B. pseudodictamnus</i> |
| 3. Calyx-limb broadly expanded, with crenate-dentate margin   | 3. <i>B. undulata</i>        |
| + Calyx distinctly toothed  | 4                            |
| 4. Floral leaves exceeding the verticillasters; calyx-teeth triangular, acute, spinulose-mucronate                | 4. <i>B. saxatilis</i>       |
| + Floral leaves inconspicuous, not exceeding the verticillasters; calyx teeth obtuse                              | 5. <i>B. kaiseri</i>         |

1. *Ballota damascena* Boiss., Diagn. Pl. Orient., ser. 2, 12: 87 (1853).

Perennial 20-50 cm, woody at the base; stems branched, densely white-woolly; leaves 0.8-1.5 x 1-2.5 cm, greyish-green, tomentose, reniform or ± orbicular, broader than long, rounded, conspicuously crenate, the base subcordate; petiole 0.5-1.5 cm, densely villous; flowers in 2-3 remote whorls; calyx 6-7 mm, obconical, densely white-woolly, 5-toothed; corolla pink; corolla-tube included, upper lip bifid, pubescent.

M, De, S; rocky hillsides and stony wadis. Egypt, Syria, Lebanon.

2. *Ballota pseudodictamnus* (L.) Benth., Lab. Gen. Sp. 594 (1834).  
Syn. *Marrubium pseudodictamnus* L., Sp. Pl., ed. 1, 583 (1753).

Perennial 20-50 cm, woody at the base; leaves yellowish, with densely felted indumentum, broadly cordate, longer than broad, obscurely crenate; petiole 0.3-1.2 cm, densely white-woolly; verticillasters several-flowered, remote; calyx 7-9 mm, infundibular, the limb 7-8 mm diam.; corolla 1.2-1.4 cm, pink; nutlets 2 x 1 mm, ellipsoid, wind-dispersed within the fruiting calyx.

M (Sollum). Crete, Libya, Egypt, Greece, Turkey.

3. **Ballota undulata** (Fresen.) Benth., Lab. Gen. Sp. 595 (1834).  
Syn. *Marrubium undulatum* Freser., Mus. Senckenb. 1: 92 (1834).

Perennial 30-60 cm, woody at the base; stems many, erect or ascending, branched, yellowish, glandular-hairy, striate; leaves 1-2.5 x 1-3.5 cm, pubescent, orbicular or reniform, crenate-undulate; petiole 0.5-1.2 cm, glandular-hairy; verticillasters many-flowered, remote; bracteoles 3-4 mm, linear or subulate-filiform, villose; calyx 0.8-1.2 cm, infundibular, 10-ribbed, expanded into a limb 1.2-1.5 cm broad; calyx-limb oblique, reticulate-veined, crenate-dentate, short-mucronate; corolla 1.5-1.8 cm, white, tube included.

De, S; stony desert wadis. Egypt, Palestine, Lebanon, Syria, Saudi Arabia.

4. **Ballota saxatilis** C. Presl in J. & C. Presl, Delic. Prag. 81 (1822) subsp. **saxatilis**

Perennial 30-60 cm, woody at the base, densely glandular-hairy, villous; stems many, erect or ascending, branched; leaves 1-3.5 x 1-2.5 cm, cordate-ovate, rounded, crenate; petiole 0.5-2.5 cm; floral leaves exceeding the many-flowered, remote verticillasters; bracteoles 2-4 mm, subulate, pubescent; calyx 6-8 mm, tubular-campanulate, densely stellate-hairy; tube 10-veined; limb 3-4 mm diam.; teeth 10, triangular, spreading, acute, spinulose-mucronate; corolla 1.2-1.4 cm, mauve; corolla-tube slightly exserted.

S; calcareous cliffs. Sinai, Palestine, Syria, Turkey.

5. **Ballota kaiseri** Täckh., Svensk Bot. Tidskr. 26: 378 (1932).

Like *Ballota saxatilis*, but densely glandular-hairy; floral leaves inconspicuous, not exceeding the verticillasters; calyx-teeth obtuse.

S; stony wadis. Endemic.

NOTE: The type of *Ballota kaiseri* was collected in Sinai, Wadi Umm Alda, 5 Sept. 1926, A. Kaiser *s.n.* (G).

## 16. **Clerodendrum** L.

Trees, shrubs or lianes; leaves simple, opposite or in whorls of 3-4, entire or toothed; flowers in lax cymes, panicles, corymbs or heads, axillary or terminal; calyx campanulate to tubular, truncate or 5-toothed, often accrescent in fruit; corolla white, blue, violet or red, ± regular or irregular; corolla-tube narrowly cylindrical, straight or curved, often widened towards the throat; stamens 4(-5), didynamous, inserted in the corolla-tube, usually long-exserted; ovary 4-locular, each locule with 1 ovule; style terminal, elongate; stigma 2-fid, exserted; drupes 4-grooved; mesocarp ± fleshy; endocarp bony, smooth or rugose, separating into 4 pyrenes or 2 pairs of pyrenes. About 400 species, tropical and warm regions, but especially Old World.

1. **Clerodendrum acerbianum** (Vis.) Benth. & Hook. f., Gen. Pl. 2: 1156 (1876).  
Syn. *Volkameria acerbiana* Vis., Ic. Pl. Aegypt. Nub. 23, t. 4 (1836).



**Plate 6. LABIATAE:** *Ballota damascena* 1, flowering branch. *Ballota pseudodictamnus* 2, flowering branch. *Ballota undulata* 3, flowering branch; flower (up right). *Ballota saxatilis* 4, flowering branch; flower (right). *Clerodendrum acerbianum* 5, flowering branch; fruiting branch (right). *Leucas inflata* 6, flowering and fruiting branch. *Leucas neuflyzeana* 7, flowering and fruiting branch. *Leucas urticifolia* 8, flowering and fruiting branch. All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbis.

Grey-pubescent shrub 1-3 m; stems straw-coloured, densely velvety-pubescent; leaves 1-8 x 0.5-4 cm, opposite or in whorls of 3-4, oblong-elliptic or -ovate, subacute to obtuse, the base rounded or subcordate; petiole 0.2-1.5 cm; flowers in dense terminal clusters on short axillary branches; pedicels short, to 7 mm in fruit; floral leaves 1-2 x 0.2 cm, or lacking, then branches resembling peduncles; bracteoles 2-3, 3 x 0.5 mm; calyx-tube 2 mm, densely pubescent; calyx-lobes 4-5, 3-6 x 1-2 mm, acuminate, woolly; corolla 1.5-2.5 cm, white, glandular-hairy outside; corolla-lobes c. 3 x 2 mm oblong-elliptic; stamens long-exserted; ovary deeply grooved into 4 lobes; fruit 0.8-1.2 cm, subglobose, covered with spongy-corky processes; calyx persistent.

N (Kom Ombo, Nubia). Nile banks. Egypt, Sudan, Kenya, Tanzania, Ethiopia, Somalia, Guinea Bissau.

NOTE: The type of *Volkameria acerbiana* was collected in Upper Egypt by Acerbi.

### 17. *Leucas* R. Br.

Annuals or perennials, pilose to villous, eglandular; leaves undivided, entire or crenate-serrate, petiolate, usually gland-dotted; verticillasters many-flowered, remote, in the leaf-axils; bracteoles numerous; flowers white; calyx 10-veined, tubular, the throat villose or villous; calyx-teeth 8-10, equal or unequal; corolla bilabiate, small, corolla-tube included in the calyx; upper lip hooded or straight, white-bearded; lower lip with a median lobe larger than the lateral, usually longer than the upper lip; stamens 4, didynamous, included within the upper corolla-lip; thecae 2-locular; style shortly 2-lobed; nutlets 4, oblong-trigonus. About 150 species, Africa, Arabia to Indomalaya.

1. Perennial, woody at the base; leaves subsessile 1. *L. inflata*  
 + Annual; leaves petiolate 2

2. Leaves 3-8 mm broad, narrowly elliptic, crenate-dentate in the proximal part 2. *L. neuflizeana*

+ Leaves 1-3 cm broad, broadly elliptic to broadly ovate, crenate-dentate along the whole margin 3. *L. urticifolia*

1. *Leucas inflata* Benth., Lab. Gen. Sp. 74 (1835).

Tomentose perennial 20-50 cm, woody at the base; stems many, branched; leaves 1-2 x 1-1.8 cm, broadly ovate to orbicular, grey-tomentose, crenate at the apex, the base subcordate, subsessile; verticillasters 6-10-flowered; bracteoles minute; calyx 5-6 mm, villous, 10-veined; teeth 10, acute-mucronate, inflated in fruit; corolla 1-1.2 cm, white, aromatic.

De, S; stony desert wadis. Egypt, Sudan, Ethiopia, Eritrea, Arabia.

2. *Leucas neuflizeana* Courbai, Ann. Sci. Nat., sér. 4, 18: 145 (1862).

Pubescent annual 10-30 cm; stems erect, simple or branched; leaves 1-2 x 0.3-0.8 cm, narrowly elliptic, crenate-dentate in the proximal part, obtuse, the base attenuate; petiole 3-5 mm; verticillasters 5-10-flowered; bracteoles 1-2 mm, subulate; calyx 4-5 mm, pubescent, 10-ribbed; teeth 1-1.5 mm, mucronate-spinulose; corolla c. 5 mm, white; nutlets 1 mm, conical, black.

GE; sandy soil in wadis. Southeast Egypt, Sudan, Ethiopia, Somalia, Socotra, Arabia.

3. **Leucas urticifolia** (Vahl) R. Br., Prodr. Fl. Nov. Holl. 504 (1810).  
Syn. *Phlomis urticifolia* Vahl, Symb. Bot. 3: 76 (1794).

Puberulent annual 10-40 cm; stems simple or branched, erect or decumbent; leaves 1-4.5 x 1-3 cm, broadly elliptic to broadly ovate, crenate-dentate along the entire margin; petiole 0.5-2 cm; verticillasters many-flowered, dense, subglobose in fruit; bracteoles 6-8 x 1 mm, linear, ciliate, acuminate; calyx 7-9 mm, 10-nerved; oblique, membranous between the nerves; teeth 10, 1 mm, mucronate-spinulose; corolla 6-7 mm, white; nutlets 1 x 0.5 mm, conical-trigonous, black, smooth.

GE; sandy soil, in wadis. Southeast Egypt, tropical East Africa, Arabia.

### 18. **Phlomis** L.

Perennials or low shrubs, woolly or felty; hairs simple, branched or stellate-dendroid; stems erect; leaves undivided, entire or crenate-serrate; verticillasters many-flowered, dense; bracteoles numerous, lanceolate to subulate, flowers ± sessile; calyx tubular, 5-10-veined; teeth 5, equal or unequal; corolla bilabiate, mostly yellow, rarely rose, purple or violet; corolla-tube included in the calyx; upper lip falcate, internally densely bearded; lower lip 3-lobed; stamens 4, didynamous included; thecae 2-locular; style 2-lobed, the lobes unequal; nutlets 4, trigonous, truncate, usually glabrous. About 100 species, Mediterranean region to Central Asia, China, usually in dry stony habitats.

1. Plant golden-woolly; calyx-lobes truncate with minute teeth

1. **P. aurea**

+ Plant white-woolly; calyx-lobes with hooked teeth

2. **P. floccosa**

1. **Phlomis aurea** Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 251 (1834).

Golden-woolly perennial 30-60 cm, woody at the base; stems erect, branched; leaves 3-10 x 1.5-3 cm, ovate-lanceolate to elliptic, entire, obtuse, the base attenuate, sessile or subsessile; verticillasters 6-12-flowered, remote; bracteoles 1-1.5 x 0.2-0.3 cm, linear-lanceolate; calyx 1.8-2 cm, broadly tubular, 10-veined, truncate; calyx-teeth minute; corolla 2.5-3 cm, yellow.

S; stony wadis. Endemic.

NOTE: Syntypes of *Phlomis aurea* were collected in Sinai, Schimper 313, Bové, Ehrenberg (K<sup>1</sup>).

2. **Phlomis floccosa** D. Don, Bot. Reg., t. 1300 (1830).

White-woolly low shrub 30-60 cm; leaves 3.5-10 x 1.5-4.5 cm, ovate-oblong, obscurely crenate, rounded, the base subcordate or truncate; lower leaves petiolate; verticillasters 5-10-flowered, remote; bracteoles 1.5-1.8 cm, linear, densely hairy; calyx 1.5-1.8 cm; calyx-teeth 2-4 mm, hooked; corolla 2-2.5 cm, yellow; nutlets 3.5 x 1.5 mm, oblong-trigonous, smooth, black.

M, O (near Wadi Natrun). Tunisia, Libya, Egypt, Palestine, Syria, southern Aegean Islands (Karpathos and Kasos), Arabia.

## 19. *Otostegia* Benth.

Shrubs or low shrubs, glabrous or pubescent with simple hairs; leaves entire, crenate or dentate, sessile or short-petiolate; verticillasters 2-8-flowered, remote; calyx tubular with a spreading limb, 10-veined, bilabiate, 5-toothed, becoming coriaceous and the limb enlarging and spreading horizontally or reflexed; corolla bilabiate, white or cream, corolla-tube included in the calyx; upper lip straight, the lower lip spreading, 3-lobed; stamens 4, didynamous; thecae 2-locular; style subequally 2-fid; nutlets ovoid, truncate. About 20 species, northeast tropical Africa to Central Asia.

1. *Otostegia fruticosa* (Forssk.) Penz., Atti Congr. Bot. Genova 356 (1892).

Syn. *Clinopodium fruticosum* Forssk., Fl. Aegypt.-Arab. 107 (1775).

Shrub 0.5-2 m, grey-pubescent; stems numerous, branched; leaves 1-5 x 0.8-4 cm, broadly ovate, crenate, obtuse, the base cuneate or rounded; petiole 0.5-2 cm; verticillasters 4-8-flowered, remote; bracteoles 0.2-1 cm, subulate; calyx 0.8-1 cm, tubular with a spreading limb, 10-veined; calyx-tube pubescent inside and outside; limb enlarging in fruit; corolla 1.6-1.8 cm, white.

Two subspecies occur in Egypt:

subsp. **fruticosa**

Plant to 2 m; leaves to 5 x 4 cm; bracteoles 0.8-1 cm.

De, R, GE; stony ground.

subsp. **schimper** (Benth.) Sebald, Stuttgarter Beitr. Naturk., ser. A, Biol. 263: 66 (1973).

Syns. *Ballota schimper* Benth. in A. DC., Prodr. 12: 519 (1848).

*Otostegia schimper* (Benth.) Boiss., Fl. Orient. 4: 776 (1879).

*Otostegia kaiseri* Täckh., Svensk Bot. Tidskr. 26: 379 (1932).

Plant 50-80 cm; leaves 1-2 x 0.8-1.5 cm; bracteoles 2-3 mm.

S; stony ground.

Area of the species: Egypt, Palestine, Sudan, Ethiopia, Arabia.

## 20. *Eremostachys* Bunge

Perennials, hairy, some hairs stellate-dendroid; leaves crenate-laciniate or pinnatisect; verticillasters many-flowered, dense; bracteoles variable; calyx tubular-campanulate to infundibular; teeth short, equal, winged or auriculate, spine-tipped; corolla bilabiate, mostly yellow, rarely white or pink; upper lip densely barbed at inner margin; lower lip 3-lobed, spreading; stamens 4, didynamous, ascending under the upper lip; style branches unequal, subulate; nutlets ovoid-triangular, truncate and hairy at the apex. About 50 species, Europe to Central Asia.

1. *Eremostachys laciniata* (L.) Bunge in Ledeb., Fl. Altaica 2: 415 (1830).

Syn. *Phlomis laciniata* L., Sp. Pl., ed. 1, 585 (1753).

Perennial 50-80 cm; stems erect, thick, mostly simple, woolly, later glabrescent; lower leaves 10-25 x 5-12 cm, long-petiolate, pinnatisect to midrib into pinnatisect segments; cauline leaves smaller, less divided, sessile; verticillasters 10-20-flowered, dense, 3-5 cm broad, rather remote, forming a white-fleecy inflorescence; bracts exceeding the calyx; bracteoles 0.8-1 cm, linear, woolly; calyx 1.5-1.8 cm, tubular-campanulate, truncate, densely fleecy; calyx-teeth 2 x 4 mm, very broadly triangular, spine-tipped; corolla 3-3.5 cm, yellow; upper lip densely hairy.

S; hillsides. Sinai, Palestine, Syria, Turkey, Transcaucasus, Iran, Central Asia.

## 21. *Prasium* L.

Shrubs; leaves dentate; verticillasters (1-)2-flowered; bracteoles absent; calyx campanulate, 10-veined, slightly bilabiate; corolla bilabiate; corolla-tube included, with a hairy ring inside; upper lip erect, ovate, entire, the lower 3-lobed, spreading; stamens 4, didynamous, ascending under the upper lip; style 2-fid, the branches equal, subulate; nutlets obovoid, truncate, drupe-like. 1 species, Mediterranean region.

1. *Prasium majus* L., Sp. Pl., ed. 1, 601 (1753).

Glabrous shrub 0.3-1.2 m; stems often climbing through other shrubs, square in section; leaves 1-3.5 x 0.5-2 cm, ovate, crenate-serrate, obtuse-mucronate, the base cordate; verticillasters 2-flowered, ± remote; pedicel 1-3 mm; calyx 1-1.2 cm, glabrous, accrescent in fruit; calyx-teeth 4-5 x 3-4 mm, triangular-ovate, aristate; corolla 1.8-2 cm, white; nutlets 3-4 mm, obovoid, truncate, drupe-like, black.

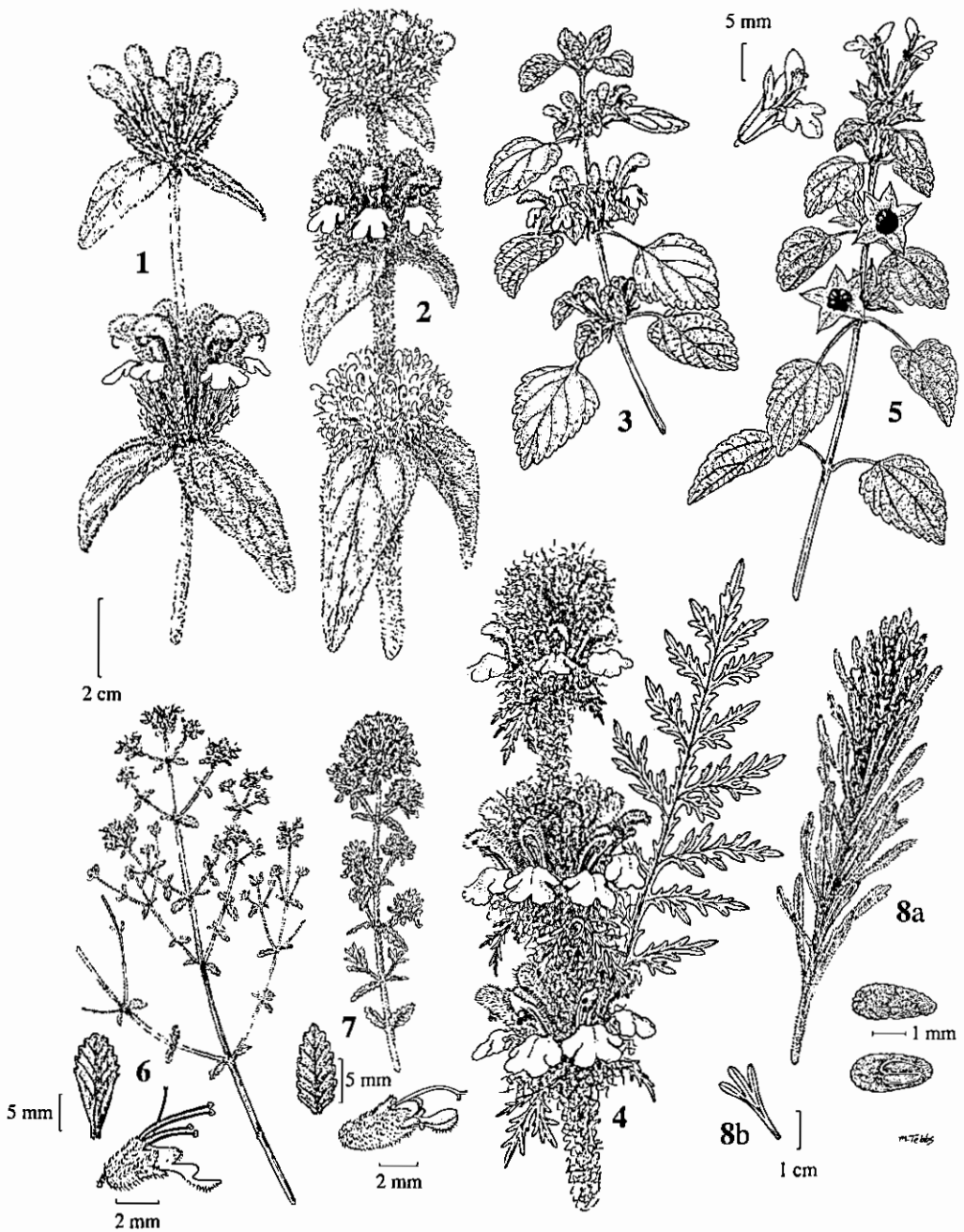
M; calcareous hillsides. Mediterranean region.

## 22. *Teucrium* L.

Literature: King, R.A. 1988. *Teucrium* in the Arabian Peninsula and Socotra. Notes Roy. Bot. Gard. Edinb. 45(1): 21-42.

Annuals, perennials or shrubs; stems tetragonal or terete; leaves short-petiolate, entire or revolute; verticillasters 2- to many-flowered, axillary or in terminal heads or spike-like inflorescences, flowers pedicellate; calyx tubular or campanulate, 10-veined, not accrescent in fruit; calyx-teeth 5; corolla of 1 spreading 5-lobed lower lip, corolla-tube short; stamens 4, didynamous, exerted; thecae 2-locular, glabrous; style exerted, not gynobasic; style branches ± equal; nutlets ovoid, reticulate. About 100 species, cosmopolitan, but especially Mediterranean region.

- |   |                          |
|---|--------------------------|
| 1. Leaves entire  | 4. <i>T. brevifolium</i> |
| + Leaves crenate to incised   | 2                        |
| 2. Stems green or purple  | 3. <i>T. decaisnei</i>   |
| + Stems white-woolly  | 3                        |
| 3. Leaves 1-3 cm, oblong-linear, with 5-7 pairs of lobes;<br>flowering branches 8-25(-40) cm, bearing the heads<br>in corymbose inflorescences                    | 2. <i>T. polium</i>      |
| + Leaves 0.5-1 cm, obovate-cuneate to elliptic-cuneate,<br>with 2-4 pairs of lobes; flowering heads on branchlets 2-8 cm;<br>branchlets spinescent after anthesis | 1. <i>T. leucocladum</i> |



**Plate 7. LABIATAE:** *Phlomis aurea* 1, flowering branch. *Phlomis floccosa* 2, flowering branch. *Otostegia fruticosa* subsp. *fruticosa* 3, flowering branch. *Eremostachys laciniata* 4, flowering branch and basal leaf. *Prasium majus* 5, flowering and fruiting branch; flower (up left). *Teucrium leuocladum* 6, flowering branch; flower (down left); leaf (left). *Teucrium polium* 7, flowering branch; flower (down); leaf (left). *Ajuga iva* 8a, flowering branch; dorsal and ventral sides of seed (down right). *Ajuga chamaepitys* subsp. *tridactylites* 8b, leaf. All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbis.



1. **Teucrium leuocladum** Boiss., Diagn. Pl. Orient., ser. 1, 5: 44 (1844).

Low shrub, 20-50 cm, often forming dense cushions to 80 cm diam., white appressed-woolly; leaves 0.5-1 cm, obovate-cuneate to elliptic-cuneate, with 2-5 pairs of lobes; stems terete, intricate; old branches woody; branchlets 2-8 cm, canescent, ending in a flowering head, spinescent after anthesis; leaves 0.5-1 cm, obovate-cuneate to elliptic-cuneate, revolute; floral leaves  $\pm$  entire; verticillasters in small globose heads; flowers  $\pm$  sessile; calyx 2.5-3 mm, campanulate, tomentose; calyx-teeth 0.5 mm, ovate, obtuse; corolla 5-6 mm, white; stamens exserted; nutlets c. 1.7 x 1.2 mm,  $\pm$  oblong, reticulate, brown.

De, S; stony wadis. Egypt, Palestine, Arabia.

NOTE: The type of *Teucrium leuocladum* was collected in Wadi Hebran, Sinai, 4 June 1835, Schimper 145 (isotypes E, K!).

2. **Teucrium polium** L., Sp. Pl., ed. 1, 566 (1753).

Perennial with a woody base, 10-40 cm, tomentose-canescens or white-woolly; leaves 1-3 cm, oblong-linear, with 5-8 pairs of lobes; stems terete, ascending or erect, branched; leaves 1-3 cm, sessile, oblong-linear, crenate, strongly revolute; verticillasters in dense globose heads on branches 8-25(40) cm; flowers sessile; calyx 3-4 mm, densely tomentose, campanulate, calyx-teeth hidden by the tomentum; corolla 5-6 mm, white; stamens slightly exserted; nutlets c. 2.2 x 1.5 mm, oblong, rugose, brown.

M, D, S, stony ground, desert wadis. Southern Russia, Balkans, Mediterranean region, Sinai, Arabia, Iraq, Iran, Afghanistan, Somalia.

NOTE: A polymorphic species, many subspecific taxa have been described from its range of distribution.

3. **Teucrium decaisnei** C. Presl, Abh. Königl. Böhm. Ges. Wiss., ser. 5, 3: 530 (1845).

Syns. *Teucrium sinaicum* Boiss., Diagn. Pl. Orient., ser. 1, 12: 91 (1853).

*Teucrium pilosum* (Decne.) Asch. & Schweinf., Mém. Inst. Egypt. 2: 189 (1887).

*Teucrium polium* L. var. *pilosum* Decne., Fl. Sin. 12 (1834).

Viscid low shrub 20-40 cm; stems green to purple, grey-hirsute, erect, branched; leaves 0.5-1.2 x 0.2-0.3 cm, sessile, oblong-linear, crenate-revolute; verticillasters forming dense heads c. 1 cm diam.; calyx c. 3 mm, hirsute-glandular; corolla 4.5-5 mm, white; anthers slightly exserted.

De, S; stony desert wadis. Libya, Egypt, Palestine, Arabia.

4. **Teucrium brevifolium** Schreb., Pl. Verticill. Unilab. 27 (1773).

Low dense rounded shrub 20-50 cm; stems woody, stiff, much-branched, appressed-canescens; leaves 0.8-1.2 x 0.15-0.25 cm, sessile, oblong-linear, entire-revolute, obtuse, greyish-tomentose; flowers opposite, solitary in the leaf axils, in short terminal racemes; calyx 4-5 mm, campanulate, 5-toothed; corolla 0.8-1 cm, pale mauve with purple veins; stamens exserted; nutlets 2-2.5 x 1.5 mm, obovoid, reticulate, brown.

M (Sollum); stony wadis. Libya, Egypt, southern Greece, Aegean Islands, southwest Turkey.

23. **Ajuga** L.  
Syn. *Chamaepitys* Hill

Annuals or perennials; leaves entire, toothed or tripartite; verticillasters 2-6-flowered; calyx tubular, 5-toothed; corolla tubular; upper lip short, 2-fid or 0; lower lip much longer, with 2 lateral lobes and a notched middle lobe; stamens 4, exserted; style not gynobasic, inserted well above the base of ovary lobes; nutlets rugose or pitted. About 50 species, Old World, but especially temperate regions.

1. Leaves linear-oblong to linear, entire or 1-3-dentate at the tip 1. **A. iva**  
+ Leaves cuneate, divided into 3 oblong,  
entire or dentate lobes 2. **A. chamaepitys** subsp. **tridactylites**

1. **Ajuga iva** (L.) Schreb., Pl. Verticill. Unilab. 25 (1773).  
Syn. *Teucrium iva* L., Sp. Pl., ed. 1, 563 (1753).

Greyish-villous perennial, 10-25 cm; stems much-branched from the base, decumbent or ascending; leaves 1-3 x 2-4 mm, oblong-linear to linear, usually entire or 1-3-dentate at tip; verticillasters 2-flowered, forming a raceme-like inflorescence; calyx 4-5 mm, tubular, villous; calyx-teeth 1.5-2 mm, triangular, acute; corolla 1.4-1.6 cm, yellow or purple; nutlets 2.5-3 x 1.5 mm, pitted.

O (Uweinat), M, S; stony wadis, roadsides. Mediterranean region, Sinai.

2. **Ajuga chamaepitys** (L.) Schreb., Pl. Verticill. Unilab. 24 (1773) subsp. **tridactylites**  
(Benth.) P. H. Davis, Notes Roy. Bot. Gard. Edinb. 38: 29 (1980).  
Syns. *Ajuga tridactylites* Benth., Lab. Gen. Sp. 699 (1835).  
*Ajuga chia* Schreb. var. *tridactylites* (Benth.) Boiss., Fl. Orient. 4: 803  
(1879), pro parte.

Perennial herb 10-25 cm, densely white-villous; stems purplish, decumbent or ascending; leaves cuneate, divided into 3 oblong, entire or dentate lobes; verticillasters 2-flowered, forming raceme-like inflorescences; calyx 4-5 mm, villous, the teeth lanceolate, shorter than the tube; corolla 1.8-2 cm, yellow, white-hairy, striated and dotted with purple; stamens exserted; nutlets 3 x 1.5 mm, transversely rugose, brown.

S; stony wadis. East Mediterranean region, Sinai, Arabia.

SOLANACEAE

F. N. Hepper

Herbs, climbers without tendrils, shrubs or small trees, glabrous or pubescent, often with stellate hairs; stems armed with prickles or unarmed; leaves usually alternate, the margins entire or sinuate or divided and lobed; stipules absent; inflorescences axillary or supra-axillary owing to adnation, or terminal cymes or panicles, sometimes flowers

solitary or few, bisexual or rarely monoecious, or part of cyme with unisexual flowers; calyx-lobes (4-)5(-6) or slightly dentate, often accrescent, rarely caducous; corolla gamopetalous, tubular, campanulate or rotate, usually regular, or slightly zygomorphic or rarely bilabiate; corolla-lobes (4-)5(-6), usually imbricate; stamens 2, 4, 5, or more, or some reduced to staminodes; anthers 2-locular, dehiscence by apical pores or longitudinal slits; disc often well-marked; ovary superior, usually 2- or 3-5-locular, with axillary placentation; ovules numerous; styles simple; stigma often 2-lobed; fruit a berry, drupe or capsule, indehiscent or dehiscing irregularly by 2-4 valves; seeds usually unwinged; embryo usually embedded in fleshy endosperm. 94 genera, about 2950 species worldwide, but especially the tropics.

- |  |                            |
|--|----------------------------|
| 1. Corolla rotate; anthers dehiscing by apical pores                                   | <b>1. Solanum</b>          |
| + Corolla usually with distinct tube; anthers dehiscing by longitudinal slits          | 2                          |
| 2. Shrubs  | 3                          |
| + Herbs (sometimes woody at base)  | 4                          |
| 3. Spiny shrubs  | <b>5. Lycium</b>           |
| + Non-spiny shrub or small tree  | <b>8. Nicotiana glauca</b> |
| 4. Corolla 6-20 cm   | <b>6. Datura</b>           |
| + Corolla much smaller   | 5                          |
| 5. Fruit (capsule) opening by a circular slit around circumference to form apical lid  | <b>7. Hyoscyamus</b>       |
| + Fruit (capsule or berry) without apical lid  | 6                          |
| 6. Woody shrub   | <b>8. Nicotiana glauca</b> |
| + Herbs, sometimes woody at base   | 7                          |
| 7. Fruit a capsule   | <b>8. Nicotiana</b>        |
| + Fruit a berry surrounded by inflated accrescent calyx                                | 8                          |
| 8. Corolla blue  | <b>4. Nicandra</b>         |
| + Corolla greenish, white or yellowish, with or without dark spots                     | 9                          |
| 9. Flowers several together on short pedicels; fruiting calyx 1-2 cm; corolla greenish | <b>3. Withania</b>         |
| + Flowers solitary on long pedicels; fruiting calyx c. 3 cm; corolla white or yellow   | <b>2. Physalis</b>         |

### 1. Solanum L.

Literature: Edmonds, J.M. & Chweya, J.A. 1997. Black nightshades, *Solanum nigrum* L. and related species. IPGRI, Rome.

Hepper, F.N. in el-Hadidi (ed.). 1998. Flora of Egypt, 159: Solanaceae. Taekholmia Additional series, Cairo Univ. Cairo.

Herbs, shrubs, climbers without tendrils, or small trees; leaves alternate, often paired, entire or irregularly toothed or divided; calyx campanulate or rotate, with 5 segments; corolla usually rotate, lobes 5; filaments very short; stamens 5; anthers with apical pore;

ovary 2-locular; ovules numerous; style simple; fruit a spherical variously coloured berry; seeds numerous, compressed. About 1700 species worldwide, but especially warm regions.

- |  |                             |
|--|-----------------------------|
| 1. Prickly   | 2                           |
| + Non-prickly  | 6                           |
| 2. Annual or perennial herb  | 3                           |
| + Shrub  | 4                           |
| 3. Leaves grey-tomentose on both surfaces; prickles conspicuous  | 1. <i>S. coagulans</i>      |
| + Leaves grey-green above, white-tomentose beneath; prickles inconspicuous   | 2. <i>S. elaeagnifolium</i> |
| 4. Prickles long and straight  | 3. <i>S. virginianum</i>    |
| + Prickles triangular, curved  | 5                           |
| 5. Stout shrub 1-2 m; fruit c. 2.5 cm, bright yellow   | 4. <i>S. incanum</i>        |
| + Slender shrub to 1 m; fruit c. 7 mm, orange  | 5. <i>S. forsskaolii</i>    |
| 6. Herbaceous annual; fruit red, yellow or black   | 7                           |
| + Undershrub or perennial herb with previous year's stems at base; fruit black, orange or red and eventually turning black | 8                           |
| 7. Stems pubescent with long hairs or with dentate ridges; fruit red or yellow   | 6. <i>S. villosum</i>       |
| + Stems glabrous or with short hairs; fruit black  | 7. <i>S. nigrum</i>         |
| 8. Low shrub 30-50 cm, or perennial herb; fruit 6 mm, orange, usually drying black (Sinai)                                 | 8. <i>S. sinaicum</i>       |
| + Shrub c. 1 m; fruit red, eventually turning black (Gebel Elba)   | 9. <i>S. schimperianum</i>  |

1. *Solanum coagulans* Forssk., Fl. Aegypt.-Arab. CVII, 47 (1775).  
Syn. *Solanum dubium* Fresen., Mus. Senckenb. 1: 166 (1833).

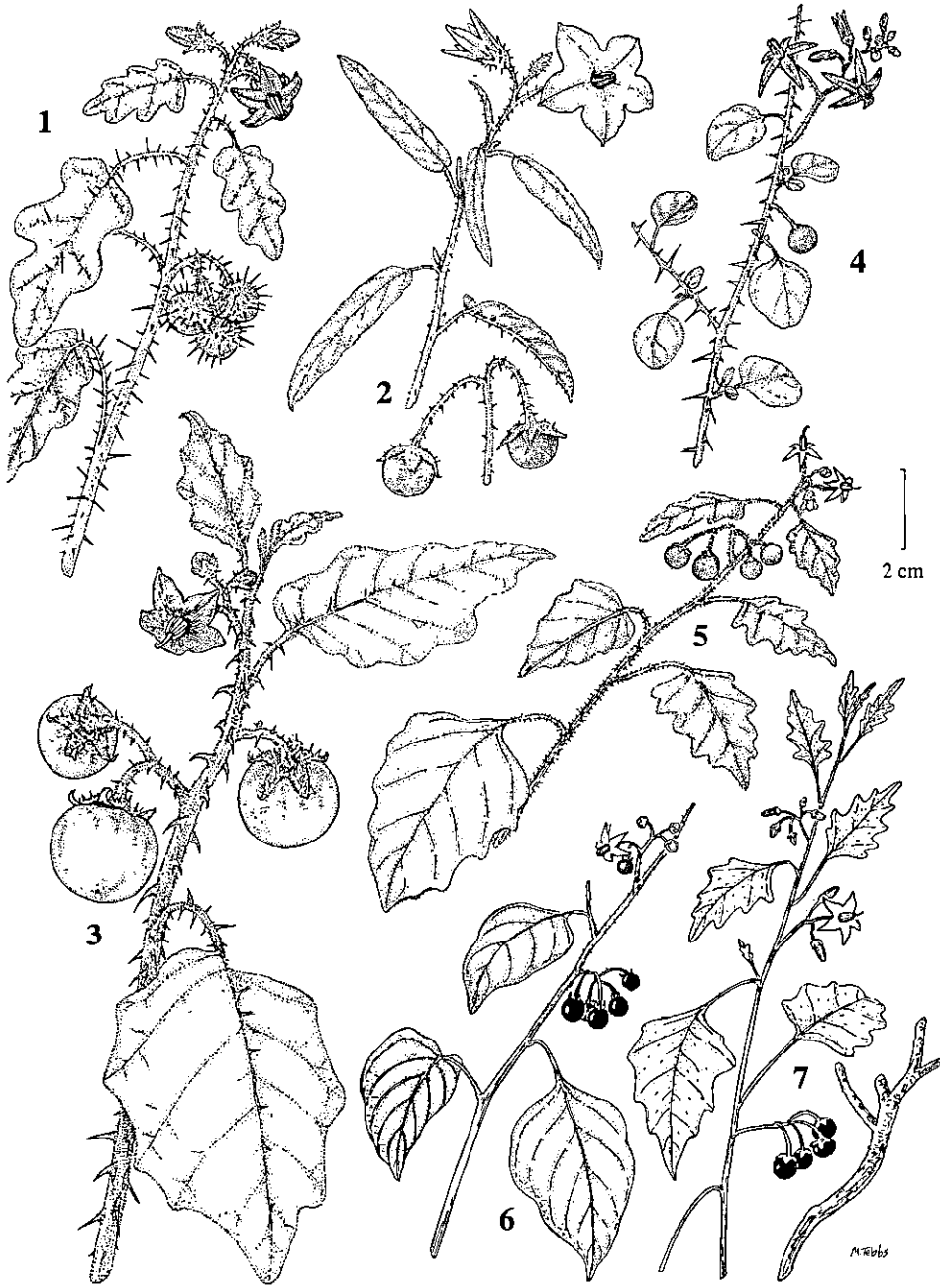
Grey-tomentose annual or perennial low shrub, 0.2-1 m; stems branched, often spreading, with slender straight spines; leaves 5-9 x 2-6 cm, ovate, sinuately lobed, with erect spines along midrib and nerves; petiole 2-6 cm, prickly; calyx 5 mm, calyx-lobes enlarging in fruit to 1.2 cm with conspicuous prickles; corolla 2 cm diam., blue-violet, tomentose outside; anthers 5-7 mm, of unequal length, yellow; berry 1 cm, spherical, yellow, enclosed by prickly accrescent calyx; seeds shiny, black.

R, GE; tropical semi-deserts and over-grazed places. Egypt, tropical East Africa, southern Arabia, both sides of the Red Sea.

NOTE: Obnoxious weed of waste sandy places owing to its sharp prickles.

2. *Solanum elaeagnifolium* Cav., Icon. Descr. 3: 22, t. 234 (1795).

Erect perennial herb 40-60 cm, sparsely prickly, the whole plant covered with white stellate hairs; leaves c. 10 x 2 cm, oblong, sinuately lobed, grey-green above, white beneath; petiole 5-20 cm; cymes few-flowered, terminal, with erect flowers and reflexed fruits; calyx-lobes 4-6 mm, linear; corolla c. 3 cm diam., white or violet, rotate; corolla-lobes broad, cuspidate; berry c. 1.2 cm, spherical, yellow, later black.



**Plate 8.** SOLANACEAE: *Solanum coagulans* 1, flowering and fruiting branch. *Solanum elaeagnifolium* 2, flowering branch; fruiting branchlet (down right). *Solanum incanum* 3, flowering and fruiting branch. *Solanum forsskaolii* 4, flowering and fruiting branch. *Solanum villosum* 5, flowering and fruiting branch. *Solanum nigrum* 6, flowering and fruiting branch. *Solanum sinicum* 7, flowering and fruiting branch; basal woody part (right). All drawings to the same scale. Drawn by Margaret Tebbs.

N, S (Rafah); sandy soils, weed of cultivation. Native to temperate South America, naturalized in the East Mediterranean region and probably elsewhere.

3. ***Solanum virginianum*** L., Sp. Pl., ed. 1, 187 (1753).

Syns. *Solanum surattense* Burm. f., Hort. Eltham. 360, t. 267 (1768).

*Solanum xanthocarpum* Schrad. & Wendl., Sert. 1: 8 (1795).

*Solanum jacquinii* Willd., Sp. Pl., ed. 4, 1: 1041 (1798).

Very prickly low shrub 20-40 cm, with divaricate branches, bearing numerous straight compressed bright yellow prickles; leaves 2-10 x 2-9 cm, deeply pinnately lobed with sinuous outlines to the lobes, very unequal at base; petiole about half length of lamina; petiole and nerves with long prickles; inflorescence to 10 cm, few-flowered, lax, very prickly; pedicel c. 1 cm; calyx subtruncate to shallowly lobed, prickly and stellate-pubescent; corolla c. 2 cm diam., violet; berry c. 2 cm, globose, yellow, glabrous.

R?; sandy soils. Egypt, Sri Lanka, India, Burma.

NOTE: *Solanum virginianum* was recorded only once from Egypt. Another very prickly low shrub with violet flowers and yellow berries 2-3 cm, *S. linnaeanum* Hepper & Jaeger (syns. *S. sodomeum* L., *S. hermannii* Dural) has been recorded once from Giza riverbank; it is naturalized in western Mediterranean region, originally from South Africa.

4. ***Solanum incanum*** L., Sp. Pl., ed. 1, 188 (1753).

Syns. *Solanum unguiculatum* A. Rich., Tent. Fl. Abyss. 2: 102 (1851).

*Solanum incanum* L. var. *unguiculatum* (A. Rich.) Bitter., Feddes Repert., Beih. 16: 276 (1923).

Erect prickly shrub 1-2 m, softly grey stellate-tomentose all over; stems branched; prickles stout, recurved; leaves 5-15 x 2.5-11 cm, ovate, obtuse, cuneate to cordate, unequal, the margins undulate or sinuately lobed, with prickles along the midrib, reticulately veined beneath; petiole 1-4 cm; flowers in short supra-axillary cymes; pedicel c. 5 mm, longer in fruit; calyx 5 mm, 1.5 cm in fruit, campanulate, with narrow lobes; corolla 2-2.5 cm diam., pale violet-purple, tomentose outside; corolla-lobes shallow, acute; berry c. 2.5 cm, globose, bright yellow, becoming dry and dusty inside, usually only 1 remaining on each inflorescence.

N, GE; sandy soils. Egypt, southwest Asia, drier parts of tropical Africa.

NOTE: The fruit is used like rennet for curdling milk.

5. ***Solanum forsskaolii*** Dunal, Hist. Nat. Solanum 237 (1813).

Syn. *Solanum albicaule* Dunal in DC., Prodr. 13 (1): 204 (1852).

Shrub to 1 m; young stems covered with dense indumentum of stellate hairs; older stems with more scattered stellate hairs and numerous long, reflexed prickles; leaves 3-6 x 1.5-4 cm, ovate to rounded, entire or repand, subcordate, grey-tomentose all over; petiole c. 1.5 cm; flowers up to 20 in branched cymes; calyx 4 mm diam., 5-toothed, grey-tomentose; corolla 2 cm diam., violet; berry c. 7 mm, globose, orange.

GE; dry savanna. Senegal to Kenya, northeast Africa, Arabia, India.

6. **Solanum villosum** Mill., Gard. Dict., ed. 8, no. 2 (1768).

Two subspecies occur in Egypt:

subsp. **villosum**

Syns. *Solanum luteum* Mill., Gard. Dict., ed. 8, no. 3 (1768).

*Solanum nigrum* L. var. *villosum* L., Sp. Pl., ed. 1, 186 (1753).

*Solanum villosum* (L.) Moench, Meth. 474 (1794).

*Solanum villosum* (L.) Lam., Encycl. 4: 289 (1797).

Erect annual to 50 cm; stems smooth, woody at the base, branched, pubescent with spreading multi-cellular glandular hairs; leaves 3-7 x 1.5-3.5 cm, ovate, entire or frequently dentate, pubescent to subglabrous; flowers in lax racemes, 3-5-flowered; pedicel reflexing in fruit; calyx 2-3 cm, calyx-lobes rounded, pubescent; corolla 1-1.5 cm diam., rotate, white; berry 0.6-1 cm, spherical, orange or yellow.

N, O, M, GE, S; weed of moist cultivated ground. Atlantic Islands, North and East Africa, Ethiopia.

subsp. **miniatum** (Bernh. ex Willd.) Edmonds, Bot. J. Linn. Soc. 89: 166, f. 1 (1984).

Syns. *Solanum miniatum* Bernh. ex Willd., Enum. Pl. Hort. Berol. 1: 236 (1809).

*Solanum alatum* Moench, Meth. 474 (1794).

*Solanum villosum* Mill. subsp. *puniceum* (Kirschleger) Edmonds, Bot. J. Linn. Soc. 78: 215 (1979).

Differs from subsp. *villosum* in having stems with dentate ridges and being glabrescent with appressed multicellular non-glandular hairs; berry usually bright red or orange.

S, De; weed of moist cultivated ground. North Africa.

7. **Solanum nigrum** L., Sp. Pl., ed. 1, 186 (1753).

Three varieties occur in Egypt:

var. **nigrum**

Erect annual to 70 cm; stems terete, branched, glabrescent to villose, with glandular and eglandular hairs; leaves 3-7 x 1.5-3.5 cm, ovate-lanceolate, entire or dentate; flowers 5-10 in simple lax cymes; pedicel recurved in fruit; calyx deeply lobed; corolla 1-1.4 cm diam., white, rather deeply lobed; berry 0.6-1 cm, spherical, glossy, black.

N, O, M, D, S; weed of cultivation. Cosmopolitan, especially in temperate regions.

var. **incisum** Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 101, f. 16a (1974).

Differs from the other varieties in having sharply incised-dentate leaves.

N; common in the Nile valley, especially to the south.

var. **elbaensis** Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 102, f. 16b (1974).

Differs from the other varieties in having its leaves cut half-way round, with sinuses between the acute or obtuse lobes.

GE; sandy soils. Endemic.

NOTE: The plant is toxic and is also used in folk medicine. The similar tropical species *S. americanum* Mill. with smaller flowers, may also occur in the warmer parts of Egypt.

8. ***Solanum sinaicum*** Boiss., *Diagn. Pl. Orient.*, ser. 1, 11: 135 (1849).

Perennial herb or undershrub, 30-50 cm.; leaves 2-5 x 1-3 cm, oblong-rhombic to ovate-oblong, sinuately dentate, sparsely pubescent, petiolate; flowers 2-5 in nodding cymes; pedicel 1-2 cm; calyx linear-oblong, obtuse; calyx-lobes 1-2 mm; corolla 1-1.5 cm diam., white with black midrib outside, reflexed over calyx; berry 6 mm, globose, orange, usually drying black.

S; rock crevices. Sinai, Palestine.

NOTE: The type of *Solanum sinaicum* was collected in Wadi El-Sheikh (near St. Katherine Monastery), Sinai, March 1846, Boissier, *s.n.* (K!). It may be conspecific with *Solanum retroflexum* Dunal, DC. *Prodr.* 13(1): 50 (1850), type from South Africa, and widespread in tropical Africa, and introduced elsewhere.

9. ***Solanum schimperianum*** Hochst. ex A. Rich., *Tent. Fl. Abyss.* 2: 98 (1850).

Syn. *Solanum carense* Dunal in DC., *Prodr.* 13 (1): 105 (1852).

Erect shrub 1-1.5 m, often much-branched; stems glabrous except young parts, unarmed; leaves 5-12 x 3-8 cm, clustered towards the ends of the stems, lanceolate-ovate, acute, rounded at the base, coriaceous, glabrous; flowers 10-30 in lateral supra-axillary cymes or sub-umbellate among leaves; peduncle c. 2 cm; pedicel 2-3 cm, puberulent, reflexed in fruit; calyx c. 2 mm, longer in fruit, acuminate; corolla deeply 5-lobed, corolla-lobes 6 mm, pale violet, reflexed; berry to 1 cm, spherical, bright red, eventually turning black.

GE; dry rocky places. Northeast Africa, Yemen.

## 2. ***Physalis*** L.

Annual or perennial herbs; leaves entire or sinuate; flowers 1-2 in leaf axils; calyx campanulate, 5-lobed, greatly enlarging in fruit and becoming membranous, sometimes coloured; corolla widely campanulate, 5-angled or shortly and widely 5-lobed; stamens 5, inserted near the base of the corolla; ovary 2-locular; fruit a berry enclosed in a bladderly persistent calyx; seeds numerous, compressed, reniform; embryo curved round the endosperm. About 80 species, North and South America, some worldwide in warmer regions.

1. Fruiting pedicel 1.5-3 cm; corolla usually yellowish throughout;  
anthers 1.5-2 mm

1. ***P. angulata***

+ Fruiting pedicel 8 mm; corolla yellowish with a dark centre;  
anthers to 5 mm

2. ***P. ixocarpa***



1. **Physalis angulata** L., Sp. Pl., ed. 1, 183 (1753).

Annual 20-60 cm, glabrous or slightly pubescent; stems angular, much-branched; leaves (2-)4-10 x (1-)2.5-4 cm, coarsely sinuate, dentate or rarely entire, ovate, acuminate, broadly cuneate and unequal-sided to rounded at the base; flowers to 1 cm or more, solitary in axils; pedicel slender; calyx truncate at base, the teeth triangular, accrescent and bladdery in fruit to 3 cm, ovoid, conspicuously acuminate; corolla c. 8 mm diam., yellowish, usually yellowish throughout; anthers blue or yellow; berries 1.5-2 cm, globose.

N; weed of cultivation and waste places, naturalized. Native to North America, naturalized in warm regions.

NOTE: *Physalis angulata* was first collected in Egypt by Boulos in 1964 from the Nile region at Ballana, south of Abu Simbel, see Feddes Repert. 73(3): 212 (1966). The berries can be eaten and are sometimes made into preserves.

2. **Physalis ixocarpa** Brot. ex Hornem., Suppl. Hort. Bot. Hafn. 26 (1819).

Syn. *Physalis aequata* Jacq. ex Nees, Linnaea 6: 470 (1813).

Annual to 60 cm or more; leaves to 11 x 6 cm, ovate or ovate-lanceolate, acute, asymmetric at the base, with few obtuse teeth; petiole 4 cm; calyx 5 mm, pubescent; calyx-teeth triangular; corolla 0.5-1 cm diam., yellowish with dark centre; fruiting calyx c. 3 x 2 cm, inflated, not angular; berry c. 1.5 cm, subspherical, yellowish-green when mature.

N; weed of cultivation. Native to Mexico, naturalized in warm regions.

NOTE: The plant is easily confused with the more robust cultivated *P. philadelphica* Lam.

3. **Withania** Pauquy, nom. conserv.

Perennial herbs or semi-woody unarmed shrubs; leaves alternate or in unequal pairs, more or less entire; flowers several together in axils on short pedicels; calyx campanulate, 5-6-toothed, much enlarged and inflated in fruit; corolla narrowly campanulate, 3-6-lobed, valvate; stamens inserted at base of corolla-tube, exserted; disc annular, crenulate or absent; ovary 2-locular, with numerous ovules; fruit a globose berry; seeds numerous, subreniform, compressed, reticulate; embryo near the margin and incurved or spiral. 10 species, mainly Old World.

1. Lamina more or less acuminate; petiole c. 1 cm;  
fruit c. 5 mm diam.

1. **W. somnifera**

+ Lamina obtuse or emarginate; petiole c. 5 mm;  
fruit c. 7 mm diam.

2. **W. obtusifolia**

1. **Withania somnifera** (L.) Dunal in DC., Prodr. 13 (1): 5, 453 (1852).

Syn. *Physalis somnifera* L., Sp. Pl., ed. 1, 182 (1753).

Erect perennial or semi-woody shrub, 0.4-1 m; whole plant hoary with stellate hairs; stems terete; leaves 2-11 x 1.5-9 cm, broadly ovate, subacute, unequal at the base, entire; flowers 3-6 together; pedicel 2-4 mm; calyx 2 mm, enlarging after flowering to 1-2 cm, the teeth linear; corolla 8 mm, clearly 5-lobed, greenish; ovary glabrous; berry c. 5 mm diam., globose, bright red; seeds 2.5 mm, compressed.



**Plate 9.** SOLANACEAE: *Physalis angulata* 1, flowering and fruiting branch. *Withania somnifera* 2, flowering and fruiting branch. *Withania obtusifolia* 3, flowering and fruiting branch. *Nicandra physalodes* 4, flowering branch; fruit enclosed by the persistent calyx (up left). *Lycium shawii* 5, flowering branch; fruiting branchlet and expanded corolla (right). *Lycium europaeum* 6, flowering branch; flower (left); fruit (down right). *Lycium schweinfurthii* 7, flowering branch; fruit and expanded flower (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

N, O, M, GE; dry waste ground. Canary Islands, Spain, Sardinia, Greece, Turkey, Africa, southwest Asia, extending to India and Australia.

NOTE: The plant is narcotic and is used in folk medicine.

2. **Withania obtusifolia** Täckh., Svensk Bot. Tidskr. 26: 370, f. 1-3 (1932).

Erect shrub 0.6-1.2 m; whole plant hoary-tomentose; leaves 10 x 5 cm, ovate-elliptic, obtuse, oblique at the base; flowers in axillary clusters; calyx *c.* 4 mm, enlarging to 1.5 cm in fruit, with teeth 3-4 mm; corolla 7 mm, yellowish-green; berry *c.* 7 mm, shining orange-red to blackish.

S, GE; dry rocky hillsides. Egypt, Palestine.

NOTE: The type of *Withania obtusifolia* was collected in Gebel Elba, Egypt, Jan. 1929, V. & G. Täckholm *s.n.* (CAI).

4. **Nicandra** Adans., nom. conserv.

Herbaceous, glabrous, leaves alternate, simple, long-petiolate; flowers actinomorphic, axillary, showy; calyx conspicuously accrescent in fruit; corolla campanulate; stamens 5, included; ovary divided in an irregular way by 3-5 septa; fruit a thin-walled berry, almost dry; seeds numerous. 1 species, Peru.

1. **Nicandra physalodes** (L.) Scopoli, Int. Hist. Nat. 182 (1777).

Syns. *Atropa physalodes* L., Sp. Pl., ed. 1, 181 (1753).

*Nicandra physalodes* (L.) Gaertn., Fruct. Sem. Pl. 2: 327, t. 131, f. 2 (1791).

Glabrous annual or perennial herb, 0.5-1 m; stems erect, angular, grooved, slender; leaves 5-20 x 2-16 cm, ovate, acuminate, cuneate at the base, coarsely and sinuately toothed; flowers solitary; calyx 5-lobed, winged, *c.* 3 cm, accrescent in fruit; corolla 3-4 cm diam., bluish with white centre; berry *c.* 1.5 cm, globose, yellow; seeds *c.* 1.5 mm, pitted, reddish-brown.

N; casual escape from cultivation, on waste heaps. Native to Peru, naturalized elsewhere.

5. **Lycium** L.

Literature: Feinbrun, N. 1968. The genus *Lycium* in the Flora Orientalis Region. Collect. Bot. (Barcelona) 7: 359-379.

Shrubs or small trees; long shoots with alternate leaves, short shoots with a cluster of leaves, usually terminating in a spine; leaves simple, entire; flowers solitary or in cymose clusters; calyx campanulate or tubular, shortly 5-toothed or slightly bilabiate, not accrescent; corolla funnel-shaped, deeply 5-lobed; stamens inserted at the mouth of the corolla-tube, included or exerted; filaments slender, glabrous or pubescent; fruit a berry within the persistent calyx. About 100 species, mainly tropical America, Africa and Asia.

1. Calyx 3-5 x 1-1.5 mm, tubular; teeth 5, equal

1. **L. shawii**

+ Calyx 1-2 mm, cup-shaped; teeth unequal, sometimes bilabiate

2

2. Calyx *c.* 2 x 1 mm, longer than broad; corolla-tube 6-9 mm, narrowly funnel-shaped and gradually widening from base to mouth

2. **L. europaeum**

+ Calyx 1-1.5 mm both ways; corolla-tube 1.5-2 cm,  
very narrow, only widening in upper part

### 3. *L. schweinfurthii*

#### 1. *Lycium shawii* Roem. & Schult., Syst. Veg. 4: 693 (1819).

Syns. *Lycium arabicum* Schweinf. ex Boiss., Fl. Orient. 4: 289 (1879).

*Lycium mediterraneum* Dunal var. *cinnamomeum* Dunal in DC., Prodr. 13  
(1): 525 (1852).

*Lycium mediterraneum* Dunal var. *leucocladum* Dunal in DC., Prodr. 13  
(1): 525 (1852).

Rounded profusely branched spiny shrub, 1-3 m; long shoots erect, downy; short shoots with terminal spine, a cluster of leaves and 1 flower; leaves 0.5-4 x 0.2-0.9 cm, subsessile, ovate to oblong, obtuse, cuneate, thick; pedicel 5-7 mm; corolla-tube 1.5 cm, glabrous inside, pale violet to blue; corolla-lobes 2 mm, ovate-oblong; stamens unequal; filaments glabrous; berry c. 5 mm, globose, orange-red or scarlet.

D, R, GE, S; stony deserts and wadis. Egypt, Palestine, Arabia, Sudan.

#### 2. *Lycium europaeum* L., Sp. Pl., ed. 1, 192 (1753).

Syns. *Lycium mediterraneum* Dunal in DC., Prodr. 13 (1): 523 (1852), pro parte.

*Lycium barbarum* L. var. *brevilobum* Post, Fl. Syria, Palest., Sinai, ed. 1,  
569 (1896); ed. 2, 2: 261, as *brevilimum* (1933).

Profusely branched shrub 1.5-4 m, glabrous, often white-mealy; long shoots erect or nodding, with a strong terminal thorn, cluster of leaves and 1-4 flowers; leaves 1.5-4 x 0.6-1.2 cm, ovate to oblanceolate, membranous, obtuse, cuneate; pedicel 5 mm; corolla c. 9 mm, whitish; corolla-lobes 2-3 mm, ovate, obtuse; corolla-tube 6-9 mm; stamens included; filaments glabrous; berry c. 6 mm, globose, red.

M, S; shrubby clumps and hedges. Southern Europe, North Africa, southwest Asia.

NOTE: The berries are edible; the plant is browsed by camels and goats.

#### 3. *Lycium schweinfurthii* Dammer in Engl., Bot. Jahrb. 48: 224 (1912).

Two varieties occur in Egypt:

##### var. *schweinfurthii*

Syn. *Lycium europaeum* L. var. *rcmulosum* (Dunal) Fiori in Fiori & Paol., Fl.  
Anal. Ital. 2: 398 (1902).

Profusely branched shrub 2-4 m; glabrous shoots stiff, downy when young, becoming glabrous and whitish; short shoots with a stout terminal spine, some leaves and 2-3 flowers; leaves 0.9-3 x 0.2-0.6 cm, glabrous, thick; pedicel 2-3 mm; calyx-teeth very short; corolla-tube very narrow, 4 times as long as the rounded ovate lobes, pale violet, glabrous; stamens included; filaments glabrous; berry 4 x 5 mm, broadly ovoid, red to black when ripe.

M; coastal scrub. Sicily, Algeria, Egypt, Palestine, Cyprus, Crete.

##### var. *aschersohnii* (Dammer) Feinbrun, Collect. Bot. (Barcelona) 7: 368 (1968).

Syn. *Lycium aschersohnii* Dammer in Engl., Bot. Jahrb. 48: 226 (1912).



**Plate 10.** SOLANACEAE: *Datura stramonium* 1, flowering and fruiting branch; capsule and seeds (down left). *Datura innoxia* 2, flowering and fruiting branch. All drawings to the same scale, except the seeds (scale given). Drawn by Magdy El-Gohary.

Like var. *schweinfurthii* but hairy inside corolla-tube.

M; coastal regions. Egypt, Palestine.

## 6. *Datura* L.

Annual or perennial herbs, or shrubs; leaves alternate; flowers solitary; calyx elongate, tubular, circumscissile; corolla large, erect, funnel-shaped or tubular, often cuspidate; stamens 5; stigma 2-lobed; style filiform; ovary 2-locular at the top and often 4-locular below; fruit a capsule, erect or pendulous, globose or ovoid, 4-valved or dehiscent irregularly, tuberculate or prickly; seeds numerous, laterally compressed; embryo curved; cotyledons semi-terete. 9 species, mainly tropical South and Central America, introduced and naturalized around the world.

1. Fruit ovoid, dehiscent by 4 valves, always erect 1. *D. stramonium*  
+ Fruit spherical, dehiscent irregularly, usually pendulous 2

2. Leaves glabrous 2. *D. metel*  
+ Leaves softly pubescent 3. *D. innoxia*

1. *Datura stramonium* L., Sp. Pl., ed. 1, 179 (1753).  
Syn. *Datura tatula* L., Sp. Pl., ed. 2, 256 (1762).

Erect annual 0.5-2 m; stems green or purple, glabrous; leaves 5-15 x 1.5-4 cm, ovate, sinuately dentate, usually glabrous, acrid-smelling; petiole 1-10 cm; flowers erect, solitary in axils; pedicel 0.5-1.5 cm; calyx 3-6 cm, evenly 5-toothed; corolla 6-10 cm, narrow, white or purplish; stamens and style included; capsule 5-7 x 3-5 cm, ovoid; seeds c. 3 x 2.5 mm, reniform, alveolate, black.

N; waste places. Cosmopolitan.

2. *Datura metel* L., Sp. Pl., ed. 1, 179 (1753).  
Syn. *Datura fastuosa* L., Syst. Nat., ed. 10, 2 (1759).

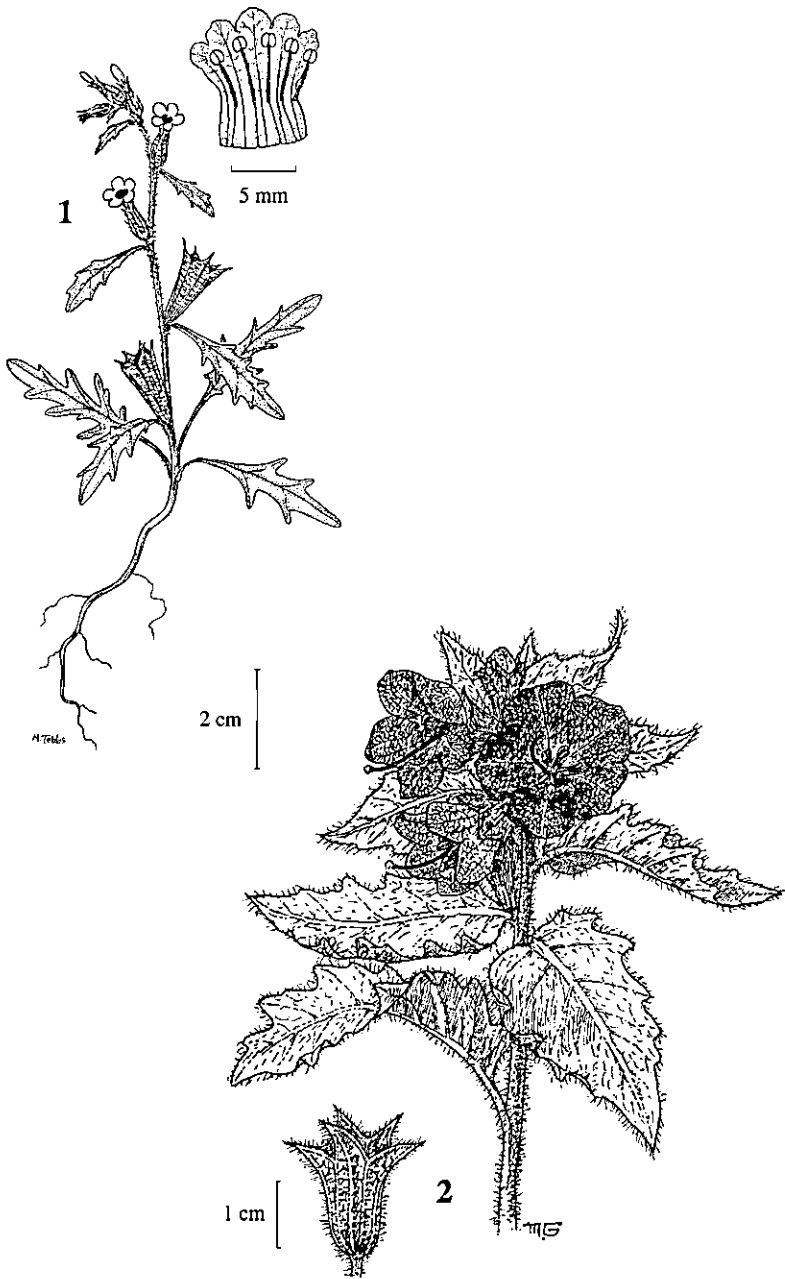
Erect soft-stemmed shrub, 0.5-1 m, green or coloured; leaves to 20 x 16 cm, elliptic to broadly ovate, acute or acuminate, unequal-sided at base, acrid-smelling, glabrous; petiole c. 8 cm; flowers erect, solitary in axils; pedicel 1-2 cm; calyx 6-8 cm; corolla c. 15 cm, creamy-white streaked with red or mauve; capsule 4-5 cm, globose, nodding, prickly or tuberculate; seeds c. 5 mm, brown.

N, M, S; occasional escape from cultivation. Native to South America, naturalized in warm regions.

3. *Datura innoxia* Mill., Gard. Dict., ed. 8, no. 5 (1768).

Shrub-like pubescent annual, 0.6-1.5 m; leaves 15-20 x 3-18 cm, long-petiolate, ovate, acute, oblique or cordate at base, the margins entire or sinuate, softly pubescent; flowers erect; calyx 8-10 cm; corolla to 12-20 cm, white tinged blue or green; capsule 4.5-5.5 cm, globose, nodding, densely covered with slender prickles; seeds reniform, light brown.

N; waste ground. Native to South America, naturalized in warm regions.



**Plate 11.** SOLANACEAE: *Hyoscyamus pusillus* 1, habit; expanded flower (up right). *Hyoscyamus reticulatus* 2, flowering branch; fruiting calyx (down left). Drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs (*H. pusillus*) and Magdy El-Gohary (*H. reticulatus*).

## 7. *Hyoscyamus* L.

Annuals, biennials or stout perennials; leaves alternate, simple, toothed or pinnatifid; flowers solitary in upper axils or congested into 1-sided circinnate spikes; calyx tubular to funnel-shaped, accrescent; broadly 5-toothed; corolla zygomorphic, broadly funnel-shaped, 5-lobed; ovary 2-locular; fruit capsular, dehiscent by a circular slit around circumference to form an apical lid. 15 species, North Africa, western Europe to Central Asia.

- |  |   |
|--|---|
| 1. Annual; corolla barely longer than the sharp calyx-teeth<br>+ Mostly perennial; corolla much longer than the calyx  | 1. <b>H. pusillus</b><br>2                    |
| 2. Upper leaves ± sessile; corolla protruding 2 cm beyond calyx, 3 cm diam.,<br>reticulate with purple veins<br>+ Upper leaves petiolate; corolla protruding 1 cm beyond calyx, to 2.5 cm diam.,<br>not reticulate | 2. <b>H. reticulatus</b><br>3                 |
| 3. Non-succulent annual or perennial; corolla partly yellow<br>+ Succulent perennial; corolla partly purple  | 4<br>6  |
| 4. Desert annual or biennial; corolla yellow or cream<br>+ Non-desert perennial; corolla white to pale or golden yellow<br>with purple centre  | 5. <b>H. desertorum</b><br>5                  |
| 5. Corolla white to pale yellow (in rough ground)<br>+ Corolla golden yellow with purple centre (on walls)   | 6. <b>H. albus</b><br>7. <b>H. aureus</b>     |
| 6. Plant hairy all over; stems short; corolla c. 3 x 3 cm<br>+ Plant puberulous to glabrous; stems long; corolla c. 2 x 2 cm   | 4. <b>H. boveanus</b><br>3. <b>H. muticus</b> |

### 1. *Hyoscyamus pusillus* L., Sp. Pl., ed. 1, 180 (1753).

Annual 5-40 cm; stems simple or branched from the base, viscid above; leaves 2-6 x 1 cm, oblong-lanceolate, petiolate, coarsely toothed or lobed; lower leaves pinnatifid; flowers subsessile; calyx 0.8-1.2 cm; fruiting calyx 1.5-2 cm, obconical, the teeth triangular with spiny tip; corolla 0.8-1.4 cm, with nearly equal yellow lobes, the throat deep purple; stamens included; capsule c. 3 mm, with recurved calyx-lobes persistently spiny.

S; calcareous ground. Sinai, Palestine, Arabia to Afghanistan, Pakistan, Central Asia.

### 2. *Hyoscyamus reticulatus* L., Sp. Pl., ed. 2, 257 (1762).

Viscid-hairy, stout, erect annual or perennial, c. 50 cm; lower leaves 10-20 x 3-5 cm, lanceolate, pinnatifid, petiolate; upper leaves ± sessile; bracteate leaves narrower, sessile; flowers shortly pedicellate; calyx-tube c. 1 cm, in fruit 1.5 cm, strongly ribbed, with sharp teeth 1 cm; corolla c. 3 x 3 cm, with broad spreading lobes, dull purple, dark-veined; fruiting calyx 2-3 cm, tubular-campanulate, with raised veins and spiny recurved teeth.

S; sandy and calcareous ground. Sinai, Palestine, Syria, Turkey.



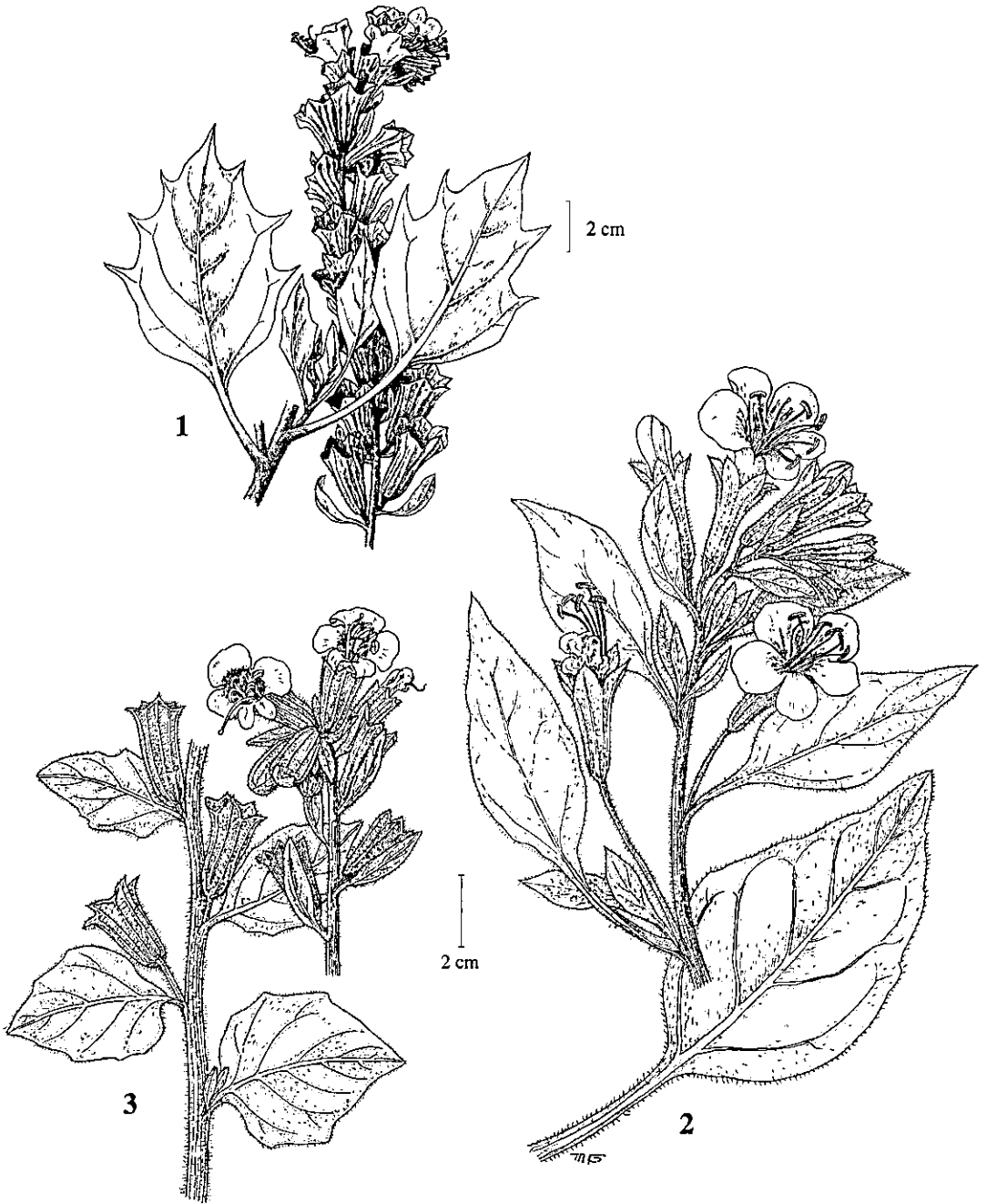


Plate 12. SOLANACEAE: *Hyoscyamus muticus* 1, flowering and fruiting inflorescence, and vegetative branch. *Hyoscyamus boveanus* 2, flowering branch and basal leaf. *Hyoscyamus desertorum* 3, flowering and fruiting branches. Drawn by Magdy El-Gohary.

3. **Hyoscyamus muticus** L., Mant. 1: 45 (1767).

Syns. *Hyoscyamus datora* Forssk., Fl. Aegypt.-Arab. 45 (1775); Icones t. 5A (1776).

*Scopolia mutica* (L.) Dunal in DC., Prodr. 13 (1): 552 (1852).

*Scopolia datora* (Forssk.) Dunal in DC., Prodr. 13 (1): 553 (1852).

Stout succulent perennial herb or shrub, over 1 m, glabrous or pubescent; stems long, much-branched in the upper part; lower leaves 8-12 x 4-9 cm, ovate to rectangular, acute, cuneate or truncate, usually with several coarse teeth; petiole to 13 cm, thick; upper leaves narrower, lanceolate, often entire; inflorescences elongating to 30 cm or more, dense; calyx 2-3 cm, with short triangular blunt teeth, becoming dry, reticulate- and many-nerved; corolla c. 2 x 2 cm, white or green, the upper lip heavily flushed purple-violet; anthers 4 mm; capsule c. 6 mm.

N, O, M, D, R, GE, S; desert wadis and plains. Libya, Egypt, Sudan, Arabia, Iran to Pakistan and India.

NOTE: Syntypes were collected in Cairo, Egypt "in desertis Kahirinis", Forsskål 423, 1347, 1837 (C). The plant has been used for medicinal remedies since ancient times.

4. **Hyoscyamus boveanus** (Dunal) Asch. & Schweinf., Mém. Inst. Egypt. 2: 113 (1887).

Syn. *Scopolia boveana* Dunal in DC., Prodr. 13 (1): 553 (1852).

Stout succulent perennial herb, 0.4-1 m, forming a rounded bush, long-pubescent all over; lower leaves long-petiolate, the lamina lanceolate to ovate, usually coarsely toothed; corolla c. 3 x 3 cm, deep crimson inside, dark purple on lower lip; upper lip white.

N, O, De, R, S; sandy soils. Endemic.

NOTE: The type of *Scopolia boveana* was collected in Sinai, Bové 78 (G-DC; K, isotype).

5. **Hyoscyamus desertorum** (Asch. ex Boiss.) Täckh., Svensk Bot. Tidskr. 36: 252 (1942).

Syns. *Hyoscyamus albus* L. var. *desertorum* Asch. ex Boiss., Fl. Orient. 4: 296 (1879).

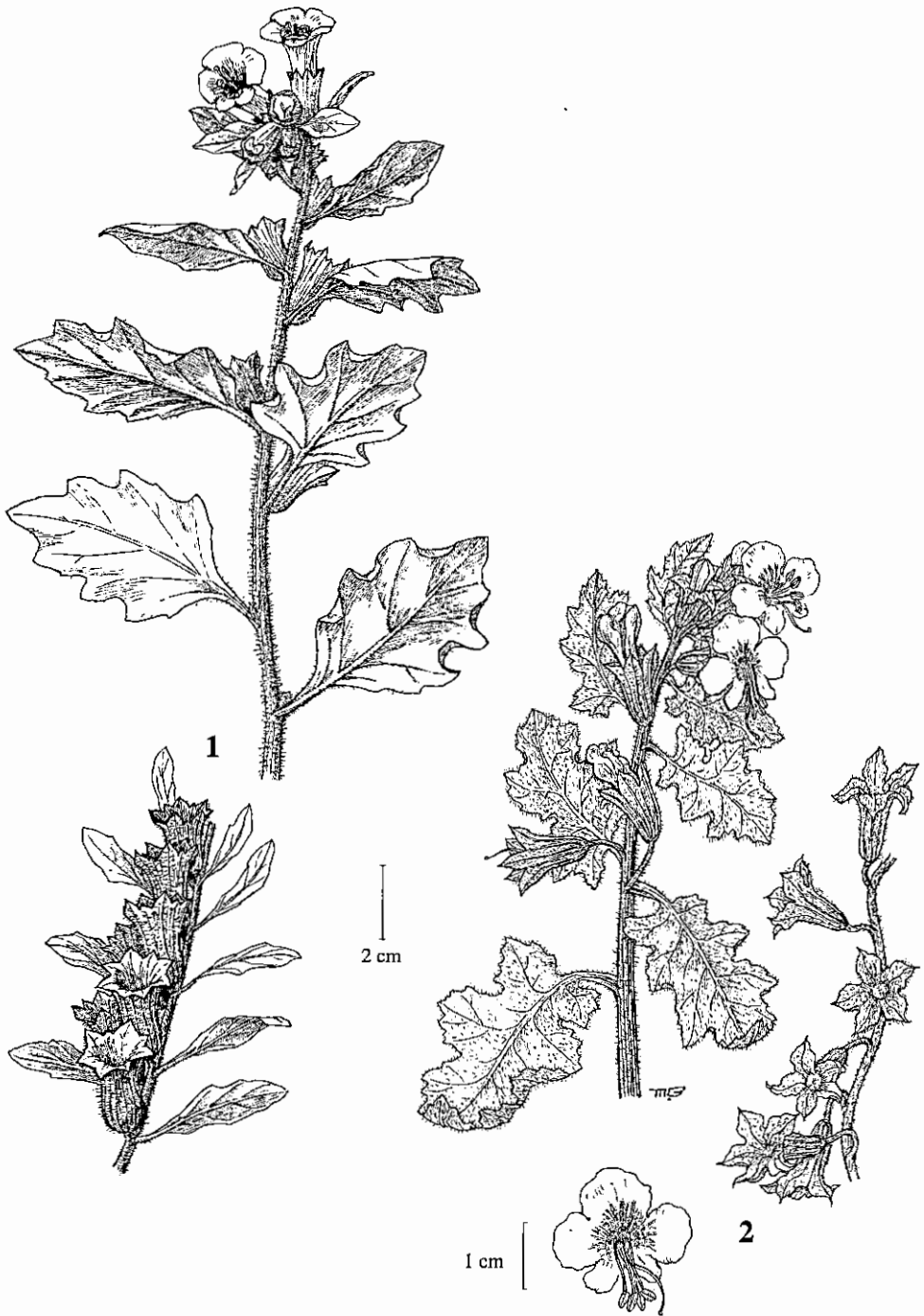
*Hyoscyamus cylindrocalyx* Rech.f., Arch. Bot., ser. 2(2): 240, t. 8a (1952).

Viscid-hairy stout annual, 25-50 cm; stems simple, or branched from the base; leaves c. 5 x 3.5 cm, ovate to rhombic, entire or with a few triangular teeth; petiole as long as the lamina; upper leaves narrower, sessile, shorter than the calyx; calyx c. 1 cm, elongate in fruit to 2-3 cm; calyx-teeth not spiny but acute in fruit, accrescent; corolla c. 2 x 3 cm, yellow with purple throat; capsule c. 8 mm.

M, De, S; sandy soils. Egypt, Palestine, Syria, northeast Saudi Arabia.

6. **Hyoscyamus albus** L., Sp. Pl., ed. 1, 180 (1753).

Erect viscid annual or perennial, 20-60 cm, with long white hairs; leaves 5-10 cm, ovate to sub-rhombic, cordate to cuneate; upper leaves lanceolate, ± entire; all leaves petiolate, softly pilose; flowers ± sessile in upper axils; calyx c. 1 cm; fruiting calyx 2-2.5 cm,



**Plate 13.** SOLANACEAE: *Hyoscyamus albus* 1, flowering and fruiting branches. *Hyoscyamus aureus* 2, flowering and fruiting branches; flower (down). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

calyx-lobes 5, erect, triangular, not spiny; corolla 1.5-3 x 2.5 cm, whitish to pale yellow; throat greenish or purple; anthers pale yellow.

M; rough ground. Southern Russia, Balkan, Mediterranean region, Arabia, Iraq.

7. **Hyoscyamus aureus** L., Sp. Pl., ed. 1, 180 (1753).

Glandular-viscid hairy perennial herb, 30-80 cm, with woody rootstock, wedged between rocks or stones; stems decumbent or erect, brittle; lower leaves 3-5 cm, ovate to orbicular, irregularly and coarsely triangular lobed, cordate, long-petiolate; upper leaves lanceolate to ovate, less toothed; calyx 1.5 cm, tubular, hairy at the base; fruiting calyx to 3 cm, tubular-campanulate, ascending or nodding, papery; corolla 2.5-3.5 cm, bright golden yellow with dark purple in throat, the lower 2 lobes much shorter than upper 3 ragged-edged lobes; stamens well-exserted; anthers pale.

De, S; old walls, cliffs. East Mediterranean region, Sinai, Arabia, Iraq.

8. **Nicotiana** L.

Annual or perennial herbs, rarely shrubs or trees; leaves simple; inflorescences terminal panicles or raceme-like cymes; calyx tubular-campanulate, 5-toothed; corolla hypocrateriform, infundibular or tubular, 5-lobed; corolla-tube long, cylindrical or slightly ventricose; stamens 5, subequal with one shorter; filaments long; fruit a 2-valved capsule, the valves 2-dentate or split; seeds minute. About 67 species, subtropical North and South America, Pacific, Australia, southwest Africa.

1. Shrub or small tree 2-6 m 1. **N. glauca**  
+ Herb or small shrub 0.3-1 m 2

2. Leaves to 30 x 24 cm, broadly ovate, the upper ovate;  
calyx-lobes broadly triangular; corolla-tube 1.5-2 cm 2. **N. rustica**

+ Leaves to 1-2(-2.7) cm, spatulate to oblanceolate or elliptic-oblong,  
the upper linear; calyx-lobes linear to filiform;  
corolla-tube 2.5-3.5 cm 3. **N. plumbaginifolia**

1. **Nicotiana glauca** R. C. Graham, Edinb. New Phil. J. 5: 175 (1828).

Shrub or small tree 2-6 m, glabrous, glaucous; leaves to 10 x 6 cm, ovate to elliptic, acute, cuneate to truncate, long-petiolate, blue-green; flowers pedicellate, in lax terminal panicles 10-20 cm; bracts 2-4 mm; calyx 1-1.5 cm, tubular, the teeth acute; corolla 2.5-3.5 cm, greenish-yellow; capsule c. 1.1 cm, ovoid, deflexed, remaining enclosed in calyx.

N, O, M, De, S; waste ground. Native to Argentina, naturalized in warm regions.

2. **Nicotiana rustica** L., Sp. Pl., ed. 1, 180 (1753).

Annual becoming shrubby, 0.5-1 m, glandular-pubescent; leaves to 30 x 24 cm, very broadly ovate, becoming ovate above, obtuse, truncate, short-petiolate; flowers in short panicles; calyx 0.7-1 cm, the lobes broadly-triangular; corolla-tube 1.5-2 cm, greenish-yellow, inflated; lobes c. 9 mm diam., rounded.

N, O (Uweinat), S; escape from cultivation. Native to Mexico and Texas, naturalized in warm regions.



Plate 14. SOLANACEAE: *Nicotiana glauca* 1, flowering and fruiting branch. *Nicotiana plumbaginifolia* 2, flowering and fruiting branch, and basal leaf. All drawings to the same scale. Drawn by Margaret Tebbs.

3. *Nicotiana plumbaginifolia* Viv., Elench. Pl. Hort. Bot. 26, t. 5 (1802).

Hispid annual 0.3-1 m; stems slender, tuberculate-hispid; leaves 1-2(-2.7) cm, spatulate to oblanceolate or elliptic-oblong; upper leaves linear, subsessile, decurrent; racemes 10-20 cm, few-flowered, lax; calyx 0.8-1.3 cm, hispidulous, with strong nerves; calyx-lobes 2.5-5 mm, linear to filiform, acute; corolla-tube 2.5-3.5 cm, greenish to dull purplish-blue; corolla-lobes c. 1 cm across, white, pink or mauve; capsule c. 8 mm.

N; moist ground, canal banks, naturalized. Argentina to Ecuador, Mexico, West Indies, naturalized elsewhere.

SCROPHULARIACEAE

L. Boulos & Britt Snogerup

Herbs or shrubs, rarely small trees; leaves simple, exstipulate, alternate, opposite or whorled; flowers bisexual, solitary in the leaf axils or in racemes or spikes, or in cymes; calyx of 4-5 sepals, bilabiate or 2-lobed; corolla zygomorphic and bilabiate, sometimes with a spur, sometimes  $\pm$  actinomorphic; corolla-lobes imbricate in bud; stamens 4, didynamous, or 2 or 5, epipetalous; staminodes 1-3 or absent; ovary superior; style terminal, 2-locular; ovules numerous or few, usually on swollen axile placenta; fruit a capsule, sometimes indehiscent; seeds numerous. About 220 genera, 4500 species, cosmopolitan, but especially temperate regions and tropical mountains.

- |   |                      |
|---|----------------------|
| 1. Stems creeping, rooting at the nodes   | 2                    |
| + Stems erect, not rooting at the nodes, or plant stemless  | 3                    |
| 2. Corolla exceeding the calyx; stamens 4   | 11. <b>Bacopa</b>    |
| + Corolla included within the calyx; stamens 2  | 12. <b>Peplidium</b> |
| 3. Plant stemless   | 13. <b>Limosella</b> |
| + Plant with well-developed stems   | 4                    |
| 4. Corolla rotate   | 5                    |
| + Corolla tubular   | 6                    |
| 5. Corolla yellow; stamens 4 or 5   | 1. <b>Verbascum</b>  |
| + Corolla blue, pink or white; stamens 2  | 14. <b>Veronica</b>  |
| 6. Corolla spurred  | 7                    |
| + Corolla not spurred, sometimes saccate at the base  | 8                    |
| 7. Flowers in spikes, racemes or heads; capsule dehiscent with 4-6 apical valves                        | 3. <b>Linaria</b>    |
| + Flowers solitary in the leaf axils; capsule dehiscent by a circumscissile lateral lid, or indehiscent | 4. <b>Kickxia</b>    |
| 8. Perennial, woody at the base   | 9                    |
| + Annual  | 11                   |

- |   |                               |    |
|---|-------------------------------|----|
| 9. Plant viscid-hairy   | 9. <i>Lindenbergia</i>        | 10 |
| + Plant not viscid-hairy                                      |                               |    |
| 10. Flowers in spike-like racemes                             | 2. <i>Anarrhinum</i>          |    |
| + Flowers in panicles   | 7. <i>Scrophularia</i>        |    |
| 11. Leaves serrate, dentate or lobed                          |                               | 12 |
| + Leaves entire   |                               | 14 |
| 12. Calyx 4-lobed   | 16. <i>Parentucellia</i>      |    |
| + Calyx 5-lobed   |                               | 13 |
| 13. At least the lower leaves lobed; corolla white            | 10. <i>Jamesbrittenia</i>     |    |
| + Leaves serrate-dentate; corolla crimson                     | 7. <i>Scrophularia arguta</i> |    |
| 14. Calyx shorter than the corolla-tube                       |                               | 15 |
| + Calyx longer than the corolla-tube                          |                               | 17 |
| 15. Corolla-lobes $\pm$ equal; stamens 2                      | 8. <i>Anticharis</i>          |    |
| + Corolla-bilabiate; stamens 4                                |                               | 16 |
| 16. Corolla 1.5-3.5 cm; anthers 1-locular                     | 15. <i>Striga</i>             |    |
| + Corolla 6-9 mm; anthers 2-locular                           | 5. <i>Schweinfurthia</i>      |    |
| 17. Flowers sessile; corolla mauve or yellow tinged with pink | 6. <i>Misopates</i>           |    |
| + Flowers pedicellate; corolla violet with white spots        | 17. <i>Lindernia</i>          |    |

### 1. *Verbascum* L.

Syns. *Celsia* L., *Staurophragma* Fisch. & Mey.

Annuals, biennials or perennials, rarely low shrubs; indumentum of eglandular or glandular, simple or branched hairs; leaves alternate, rarely opposite, simple or divided, the basal forming a rosette; flowers in terminal racemes, spikes or panicles; calyx mostly equally divided; corolla yellow, rarely violet, purple, brown or greenish, rotate,  $\pm$  actinomorphic; stamens 4 or 5, sometimes 4 fertile and 1 staminode; filaments villous, rarely glabrous, all equal or 2 anterior longer and thicker; style 1, filiform; stigma  $\pm$  spherical; capsule globose, oblong-ovoid or cylindrical, septicidal; seeds numerous, small, transversely pitted. About 360 species, Eurasia, but especially Turkey.

- |   |                            |   |
|---|----------------------------|---|
| 1. Corolla yellowish-brown; stamens 4   | 7. <i>V. decaisneanum</i>  | 2 |
| + Corolla yellow; stamens 5   |                            |   |
| 2. Flowers solitary   |                            | 3 |
| + Flowers in clusters   |                            | 5 |
| 3. Capsule 1-1.2 cm, oblong-cylindrical, spine-tipped                             | 2. <i>V. letourneuxii</i>  | 4 |
| + Capsule 3-6 mm, globose or ellipsoid-ovoid                                      |                            |   |
| 4. Flowers ebracteolate; calyx 3-5 mm; corolla 0.8-1.2 cm diam.; capsule 3-4 mm   | 3. <i>V. schimperianum</i> |   |
| + Flowers bracteolate; calyx 0.8-1.2 cm; corolla 2.5-3.5 cm diam.; capsule 4-6 mm | 1. <i>V. fruticosum</i>    |   |

5. Flowers in remote pedunculate 3-flowered dichasia,  
upper dichasia sometimes 1-flowered  
+ Flowers in clusters of 2-7 6. *V. eremobium*  
6
6. Basal leaves entire or crenulate; filaments hairy throughout,  
hairs white 4. *V. sinaiticum*  
+ Basal leaves sinuate-lobed or pinnatifid; the 2 anterior filaments  
glabrous above, hairs purple 5. *V. sinuatum*

1. ***Verbascum fruticosum*** Post in Post & Autran, Bull. Herb. Boiss. 1: 403 (1893).

Densely woolly perennial 30-80 cm, woody at the base; tomentum of eglandular branched hairs: stems branched above, leafy; basal leaves 10-18 x 4-7 cm, pinnatifid, undulate; lobes rounded, coarsely uncinately-crenate, petiolate; cauline leaves much shorter, sessile, auriculate at the base; upper leaves ovate-cordate; bracts 1-2 x 0.8-1.5 cm; flowers solitary, ± sessile, bracteolate; bracteoles 0.8-1.2 x 0.4-0.5 cm, lanceolate; calyx 0.8-1.2 cm, elongate to 1.5 cm in fruit; lobes lanceolate, acute; corolla 2.5-3.5 cm diam.; stamens 5; hairs on filaments purple; capsule 4-6 x 3 mm, subglobose, tomentose, becoming glabrous.

S; stony wadis. Sinai, Palestine.

2. ***Verbascum letourneuxii*** Asch. & Schweinf., Mém. Inst. Egypt. 2: 189 (1887).

Tomentose low shrub 30-50 cm; stems branched at the base; leaves 2-6 x 0.5-0.8 cm, oblong-lanceolate, pinnatifid; lower leaves petiolate, the upper sessile; flowers in terminal panicles; bracts 5-8 x 3-4 mm, triangular-lanceolate; pedicel 2-5 mm, thick, white-tomentose, elongate to 1-1.2 cm in fruit; calyx 3-3.5 mm, the lobes 2-2.5 mm, oblong, obtuse; corolla 1-1.2 cm diam., yellow, tomentose outside; lobes 5-6 x 3-4 mm, ± rounded; stamens 5; filaments bearded with white hairs; style recurved; stigma capitate; capsule 1-1.2 cm, oblong-cylindrical, spine-tipped, white-tomentose; seeds 1.5-2 mm, oblong, tuberculate.

M; roadsides and stony ground. Egypt, Libya.

NOTE: The holotype of *Verbascum letourneuxii* was collected in Egypt "in apricis calcareo-argillosis prope Oum Rakoumi et Matruka in Marmarica ad limites Cyrenaicae", April 1879, A. Létourneux 325 (K!).

3. ***Verbascum schimperianum*** Boiss., Diagn. Pl. Orient., ser. 1, 12: 11 (1853).

Tomentose perennial, 40-80 cm, woody at the base; tomentum of eglandular stellate hairs; leaves 3-6 x 2-3 cm, ovate-elliptic, strongly undulate, crenate, thick; lower leaves petiolate, the cauline sessile; flowers solitary, in paniculate inflorescences, ebracteolate; pedicel 1-2 mm, thickening and to 3 mm in fruit; bracts 2-3 mm, densely tomentose; calyx 3-5 mm; lobes c. 2 mm, elliptic, acute; corolla 0.8-1.2 cm diam., yellow, the throat violet; stamens 5; hairs on filaments yellow; capsule 3-4 mm, ellipsoid-ovoid, tomentose, becoming glabrous.

S; sandy desert wadis. Sinai, southern Palestine.

NOTE: The type was collected in Arabia Petraea in 1835, Schimper (G-BOIS).





**Plate 15. SCROPHULARIACEAE:** *Verbascum fruticosum* 1, flowering and fruiting branch; fruit (up right); basal leaf (right). *Verbascum letourneuxii* 2, flowering branch; fruiting branchlet (right). *Verbascum schimperianum* 3, fruiting branch; basal leaf (right). *Verbascum sinaiticum* 4, flowering and fruiting branch, and basal leaf. *Verbascum sinuatum* 5, flowering branch and basal leaf; fruit (down right). *Anarrhinum pubescens* 6, flowering and fruiting branch; fruit (up right); basal part with root (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

4. **Verbascum sinaiticum** Benth. in A. DC., Prodr. 10: 236 (1846).

Biennial 0.6-1.5 m, densely tomentose with branched eglandular rust-coloured hairs; stems simple or branched, erect, stout; basal leaves 20-60 x 5-18 cm, elliptic, entire or obscurely crenulate, broadest above the middle, thick; cauline leaves  $\pm$  sessile, the upper auriculate and slightly decurrent; flowers in clusters of 2-7; bracts 1-2 x 0.5-0.8 cm, broadly triangular, cuspidate; bracteoles 2, 4-6 mm, ovate-lanceolate; pedicel 2-4 mm, thickened in fruit; calyx 4-5 mm, tomentose, the lobes 2-3 mm, ovate-triangular, acute; fruiting calyx 6-7 mm; corolla 1.5-2.5 cm diam., stamens 5; filaments hairy all along, the hairs white; capsule 5-7 mm, ovoid, with a short mucro, tomentose, glabrescent.

S; stony and sandy desert wadis. Sinai, Palestine, Syria, Iraq, Iran, Afghanistan, Pakistan, tropical East Africa.

NOTE: The type of *Verbascum sinaiticum* was collected in Sinai, "ad fontes montis Sinai", 30 May 1835, Schimper 357 (BM!, K!).

5. **Verbascum sinuatum** L., Sp., Pl., ed. 1, 178 (1753).

Yellowish-grey tomentose biennial 40-80 cm; tomentum of stellate hairs; stems erect, branched from the base, terete or winged by decurrent leaves; basal leaves 10-40 x 5-15 cm, oblanceolate to elliptic,  $\pm$  sessile, sinuate-lobed or crenulate; cauline leaves decurrent or not, coarsely dentate or nearly entire; flowers in remote clusters of 2-7; bracts 3-6 x 2-3 mm, ovate to lanceolate; bracteoles minute; calyx 3-4 mm, the lobes lanceolate, sometimes glandular; fruiting calyx to 5 mm; corolla 1.5-2.5 cm diam.; stamens 5; the 2 anterior filaments glabrous above; hairs purple; capsule 3-4 mm, subglobose, mucronate, stellate-tomentose.

Two varieties are known, of which one occurs in Egypt.

var. **sinuatum** (not known from Egypt).

Cauline leaves decurrent; calyx-lobes eglandular.

var. **adenosepalum** Murb., Monogr. Verbas., Lunds Univ. Årsskr., n. s., 29: 371 (1933).

Cauline leaves not decurrent; calyx-lobes glandular.

N, O, De, S; waste ground.

Area of the species: East Mediterranean region, eastwards to Iran.

6. **Verbascum eremobium** Murb., Monogr. Verbas., Lunds Univ. Årsskr., n. s., 29: 458 (1933).

Yellowish-grey tomentose perennial 30-60 cm; tomentum of stellate and branched eglandular hairs; stems numerous from the woody base; lower leaves 4-8 x 1.5-3.5 cm, oblong-lanceolate, pinnatifid, crenate; flowers in remote pedunculate 3-flowered dichasia; upper dichasia sometimes 1-flowered; central flower pedicellate; pedicel with 2 spreading subulate bracteoles at the base; the 2 lateral flowers sessile in the axils of bracteoles; calyx 5-6 mm, tomentose; lobes lanceolate, acute; corolla 1.5-1.8 cm diam.,

yellow; stamens 5; hairs on filaments purple, the 2 anterior filaments glabrous above; capsule 3.5-4.5 mm, subglobose, tomentose.

S; stony desert wadis. Sinai, Palestine, Syria.

7. **Verbascum decaisneanum** Kuntze, Revis. Gen. Pl. 2: 468 (1891).

Syn. *Celsia parviflora* Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 254 (1834), non *Verbascum parviflorum* Lam. (1797).

Perennial 15-40 cm; stems numerous from a woody base; young stems brownish-purple, stellate-hairy, leafy near the base, otherwise leafless; leaves 1-2 x 0.2-0.3 cm, oblong-lanceolate, the lower 1-2-dentate, short-petiolate, the upper linear, purplish; flowers in few-flowered racemes; bracts minute, linear, acute; pedicel 0.8-1.2 cm, spreading; calyx 2 mm, glandular, the lobes lanceolate, acute; corolla c. 8 mm diam., yellowish-brown, glandular outside; stamens 4; hairs on filaments yellow; anterior filaments glabrous above; capsule 3 x 2 mm, ovoid-globose, stellate-hairy.

S; rocky hillsides. Sinai, Palestine, Arabia.

NOTE: The type of *Verbascum decaisneanum* was collected in Sinai, June 1832, Bové 70 (K!).

2. **Anarrhinum** Desf., nom. conserv.

Syn. *Simbuleta* Forssk.

Literature: Sutton, D. A. 1988. A revision of the tribe Antirrhineae: *Anarrhinum* 249-260. British Museum (Nat. Hist.) London.

Biennials, perennials or low shrubs; basal leaves in a rosette, the cauline alternate; flowers bracteate, in long racemes; calyx deeply 5-lobed; corolla tubular, bilabiate, not spurred, or spur short; throat open, without a distinct palate; stamens 4, didynamous, included; capsule subglobose, with 2 equal locules, each dehiscent by an apical 1-valved pore; seeds numerous, ovoid, tuberculate-muricate. 12 species, Mediterranean region.

1. **Anarrhinum pubescens** Fresen., Mus. Senckenb. 1: 89 (1833).

Glandular-hairy perennial 30-60 cm; stems erect, branched from the base, wiry; basal leaves 1-3 x 0.1-0.6 cm, oblanceolate, coarsely dentate in the upper part, acute, the base attenuate into a petiole 3-8 mm; cauline leaves sessile, narrowly elliptic to linear, entire, acute; flowers in spike-like racemes; bracts 2-3 mm, filiform; calyx 1-1.2 mm, deeply divided into 5 lobes, the lobes lanceolate, scarious-margined; corolla 3-3.5 mm, white; capsule c. 2.5 mm, globose, glabrous.

S; on granite rocks. Endemic.

NOTE: The holotype of *Anarrhinum pubescens* was collected in Wadi Schech (Wadi El-Sheikh), 4000 ft, Sinai, May 1832, Rüppel (FR!).

3. **Linaria** L.

Literature: Sutton, D. A. 1988. A revision of the tribe Antirrhineae: *Linaria* 260-455. British Museum (Nat. Hist.) London.

Annuals or perennials; leaves simple, sessile, opposite, whorled or alternate; flowers in bracteate racemes; calyx deeply 5-lobed; corolla glabrous except for the palate, yellow, violet or white, prolonged into a basal spur; upper lip 2-lobed; lower lip 3-lobed, with a protuberant palate that nearly closes the corolla throat; stamens 4, didynamous, included; capsule globose to broadly oblong, dehiscent by several vertical slits in the upper half; seeds angled, rugulose or discoid and winged. About 100 species, north temperate, but especially Mediterranean region.

- |   |                          |
|---|--------------------------|
| 1. Seeds discoid, with a membranous margin  | 2                        |
| + Seeds not discoid, without a membranous margin  | 3                        |
| 2. Leaves on flowering stems 2-3 mm broad; corolla 2.5-4 mm, lilac-blue; spur 1 mm                                    | 2. <i>L. micrantha</i>   |
| + Leaves on flowering stems 1 mm broad; corolla 6-9 mm, yellow; spur 2-3 mm   | 7. <i>L. simplex</i>     |
| 3. Calyx glabrous   | 4                        |
| + Calyx hairy, glandular-hairy or ciliate   | 6                        |
| 4. Corolla white; spur 1 1/2 times as long as the corolla   | 3. <i>L. chalepensis</i> |
| + Corolla yellow or white with pale violet and yellow; spur shorter than the corolla                                  | 5                        |
| 5. Leaves on flowering stems 1-1.5 mm broad, linear-filiform, alternate; seeds transversely rugose                    | 6. <i>L. tenuis</i>      |
| + Leaves on flowering stems 3-8 mm broad, elliptic to oblong-lanceolate, some opposite or whorled; seeds scrobiculate | 1. <i>L. albifrons</i>   |
| 6. Leaves 2-4 mm broad; corolla violet to purple, with a pale palate  | 5. <i>L. joppensis</i>   |
| + Leaves 1-1.5 mm broad; corolla yellow and violet; palate yellow   | 4. <i>L. haelava</i>     |

1. *Linaria albifrons* (Sm.) Spreng., Syst. Veg. 2: 793 (1825).

Syn. *Antirrhinum albifrons* Sm. in Sibth. & Sm., Fl. Graec. Prodr. 1: 432 (1809).

Glaucous glabrous annual 5-20 cm; stems simple or several from the base, branched or unbranched; leaves of flowering stems 1-3 x 0.3-0.8 cm, elliptic to oblong-lanceolate, some opposite or whorled, acute; racemes few-flowered; bracts 5-8 x 1-1.5 mm, linear; pedicel 1-2 mm; calyx 5-6 mm, glabrous, the lobes oblong-linear, subacute, ± accrescent in fruit; corolla 6-8 mm, including the spur, white with a pale violet tube and yellow palate; spur 2-3 mm, purple; capsule 5-6 x 4 mm; glabrous; seeds 0.6 mm, angular, scrobiculate, greyish-black.

M, De, S; weed of cultivation. Transcaucasus, Rhodes, Cyprus, North Africa, Sinai, Palestine, Syria, Arabia, Iran.

2. *Linaria micrantha* (Cav.) Hoffmanns. & Link, Fl. Port. 1: 258 (1813).

Syn. *Antirrhinum micranthum* Cav., Ic. Descr. Pl. 1: 51, t. 69, f. 3 (1791).

Annual 5-20 cm, glaucous, glabrous, except the sparsely glandular-hairy inflorescence; stems simple or branched, with a few sterile shoots at the base; leaves of flowering stems 1-3 x 0.2-0.3 cm, oblong-lanceolate, opposite or in whorls of 3, the uppermost alternate; flowering racemes ± capitate, elongate in fruit; bract 1-1.2 x 0.2 cm, oblong-elliptic;

pedicel 1-2 mm; calyx 3 mm, to 4-5 mm in fruit; lobes oblong-linear, obtuse, glandular-ciliate mainly along the margins; corolla 2.5-4 mm, pale blue or white; spur c. 1 mm; capsule 3-4 x 3.5 mm, subglobose, slightly exceeding the fruiting calyx; seeds 1.5 mm, discoid, with a membranous margin.

M; weed of cultivation. Southern Portugal, Mediterranean region, Arabia, Iraq.

NOTE: The occurrence of *Linaria micrantha* in Egypt needs to be confirmed by acquiring new collections.

3. ***Linaria chalepensis*** (L.) Mill., Gard. Dict., ed. 8, no. 12 (1768).  
Syn. *Antirrhinum chalepense* L., Sp. Pl., ed. 1, 617 (1753).

Glabrous annual 10-30 cm; stems simple or branched, with short sterile shoots at the base; leaves 1.5-4.5 x 0.2-0.4 cm, linear-lanceolate, alternate, the lowermost opposite or in whorls of 3, acute or acuminate; flowers in spike-like racemes; bract 1-1.4 x 0.1 cm, linear; pedicel 1-3 mm, accrescent in fruit; calyx 7-8 x 1 mm, accrescent to 1.4 cm in fruit, linear, acuminate, spreading; corolla 8-9 mm, white; spur 1.3-1.6 mm; capsule 4-5 x 4 mm, subglobose, glabrous, much shorter than the fruiting calyx; seeds 1-1.2 mm, tetrahedral, rugose.

M, S; cultivated ground. Southern Europe, Egypt, Palestine, Syria, Arabia, Iran.

NOTE: Few collections of *Linaria chalepensis* are known from Egypt, more material is required to contribute to our knowledge about its geographical distribution in the country.

4. ***Linaria haelava*** (Forssk.) Delile, Descr. Egypte, Hist. Nat. 66 (1814).  
Syn. *Antirrhinum haelava* Forssk., Fl. Aegypt.-Arab. 111 (1775).

Glaucous annual 5-15 cm, glabrous except for the glandular-hairy inflorescence; stems simple or several from the base; leaves 1-3 x 0.1-0.15 cm, linear, alternate, acuminate, the lowermost opposite or in whorls of 3-4; racemes dense, elongate in fruit; bract 4-6 x 1 mm, oblong-linear; pedicel 1-1.5 mm; calyx 3-4 x 1 mm, glandular-hairy, the lobes oblong, acute; corolla 1.5-2.5 cm including the spur, yellow and violet; palate yellow; spur 1-1.3 cm, straight, acute; capsule 3-4 mm, subglobose; seeds c. 0.5 mm, tuberculate.

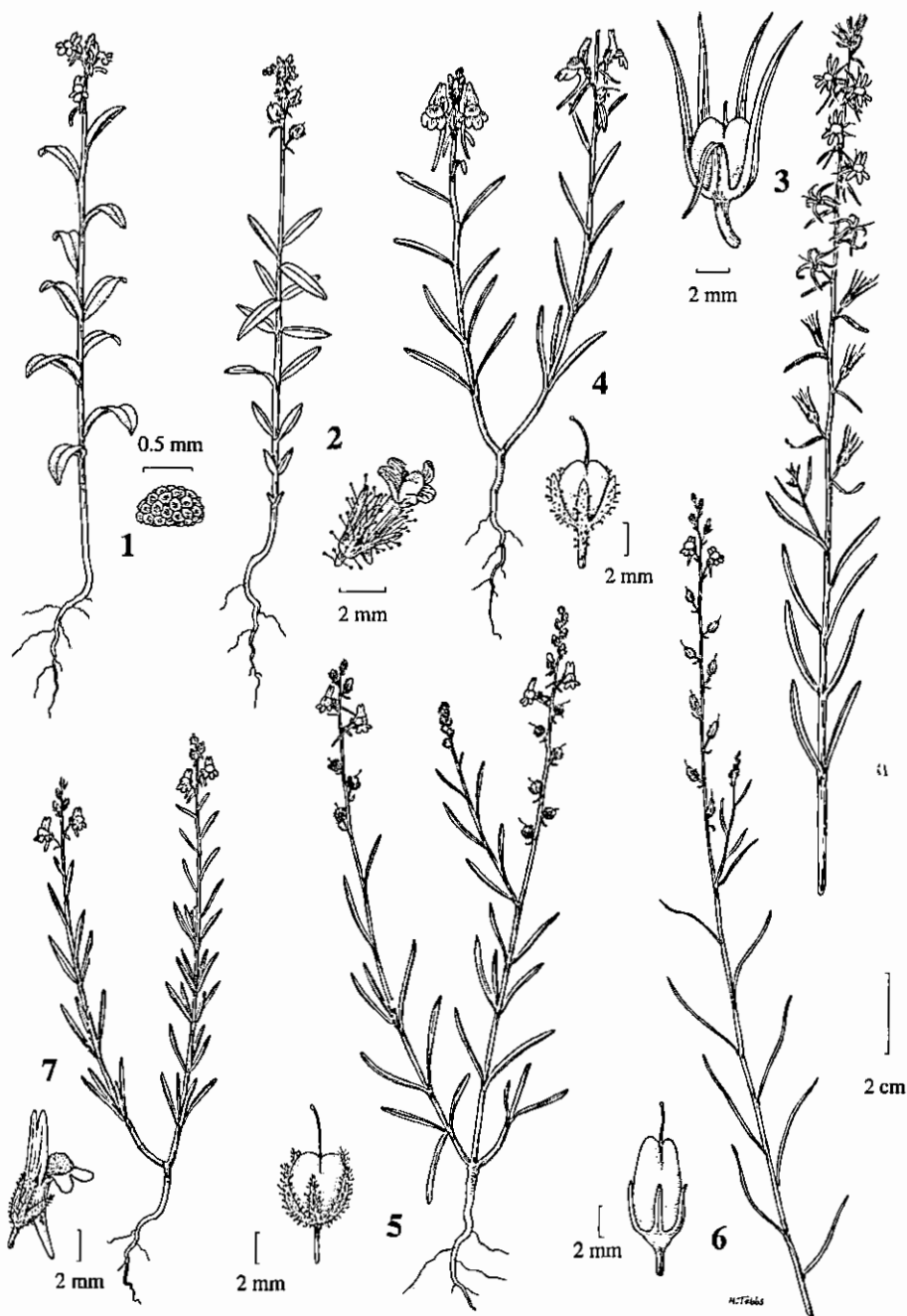
M, D, S; sandy desert plains and wadis. North Africa, Sinai, Palestine, Syria, Arabia.

NOTE: The type of *Linaria haelava* was collected in Cairo, Egypt, "in desertis Kahirinis", Forsskål Cent IV40 (C).

5. ***Linaria joppensis*** Bornm., Verh. Zool.-Bot. Ges. Wien 48: 612 (1898).

Annual 10-30 cm, glabrous except the glandular-hairy inflorescence; stems erect, branched; leaves 1-3.5 x 0.2-0.4 cm, alternate, acuminate; lower leaves opposite or in whorls of 3-4; flowers in spike-like or capitate racemes, elongate in fruit; bracts 3-6 x 0.5 mm, linear; pedicel 0.5-1.5 mm; calyx 3-4 mm, white-crisped hairy, the lobes linear, acute; corolla 1.2-1.8 cm, including the spur, violet to purple; palate pale; spur 1-1.2 cm, straight, acute; capsule 3-4 x 3 mm, subglobose, equalling the calyx; seeds 0.5 mm, reniform, rugose, greyish.

S; coastal sand dunes. Sinai, Palestine.



**Plate 16.** SCROPHULARIACEAE: *Linaria albifrons* 1, habit; seed (down right). *Linaria micrantha* 2, habit; flower (down right). *Linaria chalepensis* 3, flowering and fruiting branch; fruit (up left). *Linaria haelava* 4, habit; fruit (down right). *Linaria joppensis* 5, habit; fruit (down left). *Linaria tenuis* 6, flowering and fruiting branch; fruit (down left). *Linaria simplex* 7, habit; flower (down left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

6. *Linaria tenuis* (Viv.) Spreng., Syst. Veg. 2: 795 (1825).

Syns. *Antirrhinum tenue* Viv., Fl. Libyc. Spec. 33, t. 16, f. 5-6 (1824).

*Linaria hellenica* Turrill, Kew Bull. 1955: 356 (1955).

Glabrous annual 10-40 cm; stems several from the base, much-branched, erect; leaves 1-3 x 0.05-0.1 cm, filiform, alternate; flowers in spike-like racemes; bracts 2-4 mm, subulate; pedicel 2-3 mm, accrescent in fruit; calyx c. 3 mm, glabrous, the lobes oblong-linear, scarious-margined; corolla 0.8-1 cm, including the spur, yellow; palate yellow; spur 3-4 mm; capsule 5 x 3.5 mm, oblong-cylindrical, exceeding the persistent calyx; seeds 0.5 mm, transversely rugose, black.

De, S; sandy soils. Southeast Greece, North Africa, Sinai, Palestine, Arabia.

7. *Linaria simplex* Desf., Tab. Ecole Bot. 65 (1804).

Syns. *Antirrhinum simplex* Willd., Sp. Pl., ed. 4, 3: 243 (1800), non Link (1799).

*Linaria simplex* (Willd.) DC. in Lam. & DC., Fl. Fr., ed. 3, 3: 588 (1805),  
nom. illeg.

Annual 10-25 cm, glaucous, glabrous, except the sparsely hairy inflorescence; stems usually single, simple or branched, erect; leaves 1-2.5 x 0.1 cm, linear, in whorls of 3, the upper leaves alternate; flowers in dense capitate racemes, later elongate and lax; bracts 3-6 mm; pedicel 1-2 mm; calyx 3-4 mm, glandular-hairy, the lobes oblong-linear; corolla 6-9 mm, including the spur, yellow; spur 2-3 mm, straight; capsule 4-5 mm, subglobose, slightly exceeding the fruiting calyx; seeds c. 1.2 mm, discoid, membranous-margined; disc smooth or tuberculate.

S; stony wadis. Caucasus, Mediterranean region, Sinai, Arabia, Iran.

4. *Kickxia* Dumort.

Syn. *Elatinoides* (Chav.) Wettst.

Literature: Wickens, G.E. 1975. A revision of the *Kickxia aegyptiaca* complex (Scrophulariaceae). Kew Bull. 30: 11-15.

Sutton, D. A. 1988. A revision of the tribe Antirrhineae: *Kickxia* 169-249. British Museum (Nat. Hist.) London.

Ghebrehiwet, M. 2000. Taxonomy, phylogeny and biogeography of *Kickxia* and *Nanorrhinum* (Scrophulariaceae). Nord. J. Bot. 20(6): 655-690.

Annuals, perennials or low shrubs; leaves alternate, petiolate; flowers in bracteate racemes or solitary in the leaf-axil, pedicellate; calyx deeply 5-lobed, the lobes  $\pm$  equal; corolla bilabiate, spurred; upper lip 2-lobed, erect; lower lip 3-lobed; stamens 4, didynamous, included; capsule subglobose or ovoid, with 2 equal locules, each dehiscent by a circumscissile lateral lid, or capsule indehiscent; seeds numerous, rugose or tuberculate. 46 species, Mediterranean region to western India.

NOTE: Ghebrehiwet (2000) recognizes two genera in *Kickxia* sensu lat.: *Kickxia* Dumort. sensu str., and *Nanorrhinum* Betsche. The first three species of *Kickxia* in this treatment are transferred by her to *Nanorrhinum*:

1. *Nanorrhinum macilentum* (Decne.) Betsche, Forsch. Inst. Senkenberg 71: 132 (1984).

2. *Nanorrhinum hastatum* (Benth.) Ghebrehiwet, Nord. J. Bot. 20(6): 677 (2000).

3. *Nanorrhinum heterophyllum* (Schousb.) Ghebrehiwet, Nord. J. Bot. 20(6): 683 (2000).

These three names of *Nanorrhinum* are not listed here as synonyms to their corresponding *Kickxia* species, so much as to draw attention to this recent study.

- |  |                           |   |
|--|---------------------------|---|
| 1. Leaves 1-2 mm broad, all linear   | 4. <b>K. scoparia</b>     | 2 |
| + Leaves over 2 mm broad, at least some not linear   |                           |   |
| 2. Annual  |                           | 3 |
| + Perennial or low shrub   |                           | 5 |
| 3. Plant glabrous, except the flowers and base of the stems;<br>calyx-lobes 2.5-3.5 mm; corolla 4.5-7(-9) mm                                 | 2. <b>K. hastata</b>      | 4 |
| + Plant glandular-pubescent or villous; calyx-lobes 3.5-6 mm; corolla 1-1.8 cm   |                           |   |
| 4. Some or all upper leaves hastate or sagittate at the base   | 7. <b>K. elatine</b>      |   |
| + Leaves rounded or cordate at the base  | 8. <b>K. spuria</b>       |   |
| 5. Seeds tuberculate   |                           | 6 |
| + Seeds reticulate-areolate or with thin ridges  |                           | 7 |
| 6. Pedicel 1-2.5 mm; corolla-tube 5-6 mm diam. at the throat   | 6. <b>K. floribunda</b>   |   |
| + Pedicel 0.3-1.5 cm; corolla-tube 3.5-4 mm diam. at the throat  | 5. <b>K. aegyptiaca</b>   |   |
| 7. Plant densely pubescent throughout, somewhat viscid with glandular or<br>eglandular hairs   | 9. <b>K. acerbiana</b>    | 8 |
| + Plant glabrous above, sparsely hairy below   |                           |   |
| 8. Leaves heteromorphic, the basal oblong to broadly-ovate, the upper linear,<br>linear-lanceolate, hastate or sagittate; petiole 0.5-1.5 cm | 3. <b>K. heterophylla</b> |   |
| + Leaves homomorphic, ovate to linear-lanceolate; petiole 1.5-4 mm   | 1. <b>K. macilenta</b>    |   |

1. **Kickxia macilenta** (Decne.) Danin in Danin & Hedge, Notes Roy. Bot. Gard. Edinb. 32: 265 (1973).  
Syn. *Linaria macilenta* Decne., Ann. Sci. Nat., sér. 2, 2: 252 (1834).

Low shrub 30-60 cm, glabrous above, hairy at the base; stems erect, wiry; branches slender with spinescent tips; leaves 0.5-2.5 x 0.1-0.5 cm, homomorphic, 0.5-2.5 x 0.1-0.5 cm, ovate to linear-lanceolate, acute, entire, rounded or sagittate at the base, deciduous; petiole 1.5-4 mm; pedicel 2-5 mm; calyx 2.5-4 mm, the lobes lanceolate, acuminate, scarious-margined at the base, glabrous or sparsely glandular-hairy; corolla 0.75 x 1.1 cm, yellow with red spots and veins, hairy outside; spur 3.5-4.5 mm; capsule 2-3 mm, ovoid; loculi unequal; seeds 0.6 mm, compressed, oblong-ellipsoid, tuberculate, brownish.

S; rocky fissures in the mountains. Sinai, Palestine.

NOTE: The type of *Linaria macilenta* was collected in the Sinai desert, June 1832, Bové 74 (holo P, iso G, K!).

2. **Kickxia hastata** (R. Br. ex Benth.) Dandy in Andrews, Fl. Pl. Sudan 3: 137 (1956).  
Syn. *Linaria hastata* R. Br. ex Benth. in A. DC., Prodr. 10: 269 (1846).

Annual 5-40 cm, glabrous except for the flowers and base of the stems; stems erect, slender, simple or branched; leaves heteromorphic; basal leaves 0.5-1.5 x 0.25-1.2 cm, lanceolate to orbicular; petiole 3-6 mm; cauline leaves 1-3.2 x 0.1-1.4 cm, linear to lanceolate, hastate to sagittate, the uppermost attenuate at the base; pedicel 1.5-3.5 cm,



filiform; calyx-lobes 2.5-3.5 mm, lanceolate, acute, margins scarious; corolla 4.5-7(-9) mm, yellow to orange, glabrous externally; palate lanate; spur 3.5-4.5 mm; capsule 2.5-3.5 mm, ovoid; seeds 0.5 mm, oblong-ellipsoid, tuberculate, brownish.

GE; sheltered crevices between rocks. Southeast Egypt, Sudan, Ethiopia, Arabia, Socotra, Solomon Islands.

3. **Kickxia heterophylla** (Schousb.) Dandy in Andrews, Fl. Pl. Sudan 3: 137 (1956).

Syn. *Antirrhinum heterophyllum* Schousb., Vextr. Marokko, K. Dansk. Vidensk. Selsk. Skr. 1, 1: 194, t. 3 (1800).

Perennial 20-60 cm, woody at the base; stems much-branched from the base, prostrate or ascending, slender, glabrous above, sparsely hairy below; leaves heteromorphic; basal leaves 1-2 x 0.5-1.2 cm, oblong to ovate, rounded at the base; petiole 2.5-9 mm; cauline leaves 2-4 x 0.2-0.8 cm, linear, linear-lanceolate or oblong, hastate, sagittate or rounded at the base; petiole 0.5-1.5 cm; pedicel 0.3-1.2 cm; calyx lobes 3-4 mm, acute, the margins scarious; corolla glandular-pubescent outside; palate lanate; spur 6-7 mm; capsule 3 mm, oblong-ovoid; loculi equal, dehiscent; seeds 0.6 mm, oblong-reniform, tuberculate, brown.

De, R, GE; stony ground. Canary Islands, Mauritania, North Africa, Sudan, Chad, Sierra Leone.

4. **Kickxia scoparia** (Spreng.) Kunkel, Monogr. Biol. Canar. 3: 67 (1972).

Syns. *Linaria scoparia* Spreng., Syst. 2: 789 (1825).

*Linaria spartioides* Brouss. ex Buch, Phys. Besch. Canar. Ins. 143, 163 (1828).

*Kickxia spartioides* (Brouss. ex Buch) Janch., Österr. Bot. Z. 82: 152 (1933).

Glabrous perennial 25-50 cm, woody at the base; stems rigid; old branches spinescent; leaves 1-3 x 0.1-0.2 cm, linear, mucronate, short-petiolate; pedicel 0.8-1.5 cm, capillary; calyx 3.5-4 mm, glabrous or glandular-hairy; lobes ovate, acuminate, the margins scarious; corolla 1.5-2.5 cm, including the spur, yellow; capsule 3-4 mm, glabrous or sparsely glandular, dehiscing by persistent lids; seeds 0.6 mm, tuberculate.

GE, S; stony desert wadis. Canary Islands, Egypt, Palestine, Arabia, Sudan.

5. **Kickxia aegyptiaca** (L.) Nábelek, Publ. Fac. Sci. Univ. Masaryk Brno 80: 30 (1926).

Syns. *Antirrhinum aegyptiacum* L., Sp. Pl., ed. 1, 613 (1753).

*Linaria aegyptiaca* (L.) Dum. Cours., Bot. Cult., ed. 2, 2: 92 (1801).

*Elatinoides aegyptiaca* (L.) Wettst. in Engl. & Prantl, Natürl. Pflanzenfam. IV, 3b: 58 (1891).

Perennial 20-50 cm, woody at the base; stems prostrate or ascending, much-branched, the branches dense, often spinescent, glandular pubescent; hairs uni- or multicellular, glandular or eglandular; leaves 0.3-1.5 x 0.15-0.8 cm, lanceolate or ovate, the margins entire or dentate, the base rounded or hastate, densely hairy; pedicel 0.3-1.5 cm; calyx 3-5 mm, densely hairy, the lobes lanceolate, acuminate; corolla 1.25-1.8 cm, pale yellow, glandular-hairy outside; corolla-tube 3.5-4 mm diam. at the throat; palate hairy; spur 7-9 mm; capsule 1.75-2.5 mm, glandular-hairy, loculi unequal; seeds c. 1 mm, oblong-ovoid, tuberculate, brown to blackish.

Several subspecies of *Kickxia aegyptiaca* were described (Wickens, 1975), of which one subspecies occurs in Egypt:

subsp. **aegyptiaca**

Syns. *Linaria aegyptiaca* (L.) Dum.Cours., Bot. Cult., ed. 2, 2: 92 (1801) var. *heterophylla* Bornm., Allg. Bot. Zeit. 15: 131 (1909).

*Linaria aegyptiaca* (L.) Dum.Cours. subsp. *eu-aegyptiaca* Maire, Bull. Soc. Hist. Nat. Afr. Nord 16: 95 (1925).

Plant conspicuously glandular pubescent: calyx 3-5 mm; corolla 1.25-1.8 cm.

M, D, R, S; desert wadis and sandy plains. Egypt, Palestine.

Area of the species: North Africa, East Mediterranean region, Sinai, Arabia.

NOTE: The type of *Kickxia aegyptiaca* subsp. *aegyptiaca* (based on *Linaria aegyptiaca* var. *heterophylla*) was collected near the Giza Pyramids, Egypt, Bornmüller *s.n.* (holotype, B).

6. ***Kickxia floribunda*** (Boiss.) Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 97 (1974).  
Syn. *Linaria floribunda* Boiss., Diagn. Pl. Orient., ser. 1, 12: 40 (1853).

Densely villous perennial 10-30 cm, woody at the base; stems numerous from the base, branched, procumbent; leaves 1-1.5 x 0.2-0.4 cm, homomorphic, lanceolate to elliptic, acute, entire, the lowermost dentate, attenuate at the base; petiole 2-8 mm; pedicel 1-2.5 mm; calyx 3-5 mm; lobes linear, acuminate, the margins narrowly scarious, villous; corolla 1.3-1.6 cm, pale yellow, sparsely pilose outside; corolla-tube 5-6 mm diam. at throat; palate pubescent inside; spur 6-8 mm, curved; capsule 2-2.5 mm, subglobose, glandular-puberulent, the corolla often persistent; loculi subequal, tardily dehiscent; seeds 0.6-1.1 mm, tuberculate.

De, S; sandy and stony desert wadis. Egypt, Palestine.

7. ***Kickxia elatine*** (L.) Dumort., Fl. Belg. 35 (1827) subsp. ***crinita*** (Mabille) Greuter, Boissiera 13: 108 (1967).  
Syn. *Linaria crinita* Mabille, Rech. Pl. Corse, fasc. 1: 30 (1867).

Glandular-hairy to villous annual, 15-60 cm; stems much-branched, prostrate to ascending; leaves heteromorphic; basal leaves 1.5-2.5 x 1-2 cm, oblong-ovate to suborbicular, obtuse, entire or dentate, the base rounded or cuneate, petiole 0.4-1 cm; upper leaves 0.4-3 x 0.15-0.25 cm, ovate-lanceolate, hastate, sagittate, petiole 0.3-1.2 cm; pedicel 1.2-2.5 cm, slender; calyx 4-6 mm, the lobes lanceolate, acuminate, scarious-margined, sparsely to densely villous; corolla 0.6-1 cm, yellow, densely hairy outside; palate often with violet spots, densely hairy inside; spur 5-6 mm; capsule 3.5-4.5 mm, globose, puberulent; seeds 1-1.2 mm, oblong-ovoid, reticulate-alveolate, dark-brown.

N, O, M; edges of cultivation, alluvial and sandy desert plains. Southern and eastern Europe, North Africa, southwest Asia, widely naturalized in temperate regions.

NOTE: According to D. A. Sutton, A revision of the tribe Antirrhineae 174 (1988), two subspecies are known in *Kickxia elatine*; the Egyptian material belongs to subsp. *crinita*.



**Plate 17. SCROPHULARIACEAE:** flowering and fruiting branches of: *Kickxia hastata* 1. *Kickxia heterophylla* 2. *Kickxia aegyptiaca* subsp. *aegyptiaca* 3; flower (up). *Kickxia floribunda* 4; flower (up). *Kickxia elatine* subsp. *crinita* 5, habit. *Kickxia spuria* 6; flower (right); seed (left). *Kickxia acerbiana* 7; flower and fruit (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbis.

8. *Kickxia spuria* (L.) Dumort., Fl. Belg. 35 (1827) subsp. *integrifolia* (Brot.) R. Fernandes, Bot. J. Linn. Soc. 64: 74 (1971).  
Syn. *Antirrhinum spurium* L. var. *integrifolium* Brot., Phyt. Lusit. 2: 119, t. 128 (1827).

Glandular-hairy to villous annual, 20-50 cm; stems branched, decumbent or prostrate; leaves homomorphic, 1-3.5 x 0.5-3 cm, broadly ovate, truncate to subacute, the margins entire or denticulate, rounded or cordate at the base; petiole 2-5 mm; pedicel 0.4-1.5 cm; calyx 3.5-4.5 mm; lobes ovate, glandular-hairy, the margins villous; corolla 1.2-1.8 cm, yellow and purple, hairy outside; spur 6-8 mm, curved; capsule 3.5-5 mm, subglobose, dehiscent; seeds c. 1 x 0.6 mm, oblong-ellipsoid, reticulate-alveolate, brown.

N, S; edges of cultivation. Macaronesia, Europe, North Africa, southwest and Central Asia.

9. *Kickxia acerbiana* (Boiss.) Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 98 (1974).  
Syns. *Linaria acerbiana* Boiss., Fl. Orient. 4: 366 (1879).  
*Linaria nubica* Skan in Dyer, Fl. Trop. Afr. 4(2): 290 (1906).  
*Linaria kneuckeri* Bornm., Allg. Zeitschrift. 15: 130 (1909).  
*Kickxia nubica* (Skan) Dandy in Andrews, Fl. Pl. Sudan 3: 137 (1956).  
*Kickxia kneuckeri* (Bornm.) Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 97 (1974).  
*Kickxia scariosepala* Täckh. & Boulos, Publ. Cairo Univ. 5: 98 (1974).

Densely pubescent to somewhat viscid annual or short-lived perennial, 20-50 cm, sometimes woody at the base; hairs glandular or eglandular; stems erect, ascending or procumbent; leaves homomorphic, 0.5-2.5 x 0.25-1.5 cm, ovate to lanceolate, acute or apiculate, entire or shallowly denticulate, truncate to subcordate at the base; petiole 0.3-1.5 cm; pedicel 1.5-3 mm, rigid in fruit; calyx 3-4 mm, glandular-hairy, the lobes lanceolate, acuminate, the margins scarious below; corolla 0.8-1.1 cm, pale yellow, densely pubescent outside; palate red-spotted, sparsely hairy; spur 3-5 mm, slightly curved; capsule 2.5-3.5 mm, broadly ovoid; loculi unequal, dehiscent, seeds 0.5 mm, oblong-ovoid, tuberculate, yellowish-brown.

D, R, GE, S; sandy wadis and desert plains. North Africa, Sinai, East Mediterranean region, Arabia.

NOTE: The type of *Linaria acerbiana* was collected in the Red Sea region by Acerbi; syntype from the Eastern Desert, between Quseir and Ras-Benas, Schweinfurth 229. The type of *Kickxia scariosepala* was collected in the mountains of Feiran Oasis, Sinai, 13 March 1956, V. Täckholm 187 (CAI!). A very variable species described under different names (see synonyms).

## 5. *Schweinfurthia* A. Br.

Literature: Sutton, D. A. 1988. A revision of the tribe Antirrhineae: *Schweinfurthia* 135-141. British Museum (Nat. Hist.) London.

Annuals or perennials; leaves homomorphic, simple, entire, pinnately veined, petiolate or subsessile, alternate, the lowermost opposite; flowers zygomorphic, pedicellate, in lax

racemes or solitary in leaf-axils; bracts or floral leaves sometimes subtending axillary branches; calyx deeply divided, the lobes entire, imbricate, unequal, scarcely accrescent; corolla-tube ± cylindrical; limb bilabiate, the lips ± equal; fertile stamens 4, didynamous, anthers 2-locular; staminode minute; style simple, erect; stigma capitate; capsule globose, the walls papyraceous, the septum oblique; locules very unequal, few-seeded, indehiscent. 6 species, northeast Africa, Arabia to India.

1. **Schweinfurthia pedicellata** (T. Anderson) Balf.f., Trans. Roy. Soc. Edinb. 31: 201 (1888).

Syns. *Anarrhinum pedicellatum* T. Anderson, J. Linn. Soc. London, Bot. Suppl. 5: 26 (1861).

*Anarrhinum apterum* Vatke, Österr. Bot. Zeitschr. 25: 96 (1875).

*Schweinfurthia aptera* (Vatke) Dyer, Fl. Trop. Afr. 4: 294 (1906).

Glabrescent annual, 20-60 cm; stems erect, terete, much-branched; leaves 1-4.5 x 0.1-0.25 cm, linear, attenuate at the base into a petiole 1-5 mm, or subsessile; flowers in lax racemes; pedicel 1-1.8 cm, patent, scarcely elongate in fruit; calyx-lobes 3-5 x 1-2 mm, unequal, narrowly scarious-margined; corolla 6-9 mm, white to pale lilac, the palate tinged with yellow; capsule 4-6 mm; seeds 1.2-1.5 mm, oblong-ovoid, truncate, cristate, the ridges thin.

GE; sandy and stony ground. Southeast Egypt, northeast Sudan, tropical East Africa, Arabia.

## 6. **Misopates** Rafin.

Literature: Sutton, D. A. 1988. A revision of the tribe Antirrhineae: *Misopates* 145-155. British Museum (Nat. Hist.) London.

Annuals; leaves simple, homomorphic, linear, elliptic or lanceolate, entire, short-petiolate to sessile, opposite below, alternate above; flowers zygomorphic, pedicellate, in leafy or bracteate racemes; calyx deeply divided, usually exceeding the corolla-tube; corolla bilabiate; the tube cylindrical or somewhat urceolate; the lips subequal, with prominent basal palate occluding mouth of tube; fertile stamens 4, didynamous, included; staminode minute; style simple; stigma capitate; capsule ovoid to oblong; loculi unequal, many-seeded, dehiscing by a single apical pore with irregular teeth; seeds bilaterally symmetrical, with conspicuous dorsiventral asymmetry; hilum sub-basal on dorsal face, granulate. 7 species, Europe, North Africa, Atlantic Islands, southwest to southern Central Asia.

1. Corolla pink; capsule 8-9 x 4-5 mm; ventral face of seeds with sinuate marginal ridge and median ridge

1. **M. orontium**

+ Corolla yellow tinged with pink; capsule c. 6 x 3.5 mm; ventral face of seeds with straight marginal ridge, and without median ridge

2. **M. microcarpum**

1. **Misopates orontium** (L.) Rafin., Autikon Bot. 158 (1840).

Syn. *Antirrhinum orontium* L., Sp. Pl., ed. 1, 617 (1753).

Glabrescent to densely glandular-pubescent annual, 10-50 cm; stems erect or ascending, usually simple; leaves 1.5-4 x 0.1-0.6 cm, linear, elliptic or lanceolate, subacute; pedicel 0.5-2.5 mm, elongate to 4 mm in fruit; calyx-lobes 7-9 mm, unequal, elongate in fruit to

1.2 cm, linear, acute, covered with eglandular and shorter glandular hairs; corolla c. 6 mm, mauve; capsule 8-9 x 4-5 mm, ovoid, densely glandular-hairy; seeds 0.9-1.1 mm; ventral face with marginal ridge sinuate; median ridge present, papillose.

N, M, De, GE, S; weed of cultivation, waste ground, sandy deserts. Atlantic Islands, southern and western Europe, North Africa, southwest and southern Central Asia.

2. **Misopates microcarpum** (Pomel) D. A. Sutton, Revis. tribe Antirrhineae 151 (1988).

Like *Misopates orontium*, but corolla yellow tinged with pink; capsule c. 6 x 3.5 mm; ventral face of seeds with marginal ridge straight; median ridge absent.

De (North Galala), desert wadis. North Africa, Iberian Peninsula.

NOTE: The only Egyptian specimen traced of this species was collected in a wadi, North Galala, Eastern Desert, Egypt, 2 April 1924, N. D. Simpson 2862 (K!)

## 7. **Scrophularia** L.

Annuals, biennials, perennials or low shrubs; leaves usually opposite, entire to pinnatisect; inflorescence racemose or paniculate; flowers in cymes, rarely single, in the axils of leafy or reduced bracts; calyx deeply 5-lobed, the lobes scarious-margined; corolla bilabiate or with  $\pm$  equal lobes; tube  $\pm$  ventricose; fertile stamens 4; anthers glabrous or rarely glandular; staminode scale-like or absent; capsule globose or ovoid, septical, with 2 entire or 2-fid valves; seeds numerous, ovoid, pitted. About 200 species, North temperate regions, tropical America.

- |  |                           |   |
|--|---------------------------|---|
| 1. Annual  | 1. <b>S. arguta</b>       | 2 |
| + Perennial or low shrub   |                           |   |
| 2. Leaves unlobed  |                           | 3 |
| + Leaves lobed or deeply 1-2-pinnatisect   |                           | 4 |
| 3. Leaves 0.5-1.5 x 0.2-0.4 cm, spatulate, all alternate, entire                       | 2. <b>S. syriaca</b>      |   |
| + Leaves 2-5 x 1.5-3 cm, broadly ovate, at least the lower opposite, dentate           | 3. <b>S. libanotica</b>   |   |
| 4. Leaves 1-3(-4) cm, fleshy, obtusely dentate or shallowly lobed, white-margined      | 4. <b>S. deserti</b>      |   |
| + Leaves to 8 cm, 1-2-pinnatisect, neither fleshy nor white-margined; leaf-lobes acute |                           | 5 |
| 5. Leaves 1-pinnatisect  | 7. <b>S. canina</b>       |   |
| + Leaves 2-pinnatisect   |                           | 6 |
| 6. Cymes 5-8 cm, 3-18-flowered; capsule 4 x 3 mm                                       | 5. <b>S. xanthoglossa</b> |   |
| + Cymes 2-5 cm, 3-5-flowered; capsule 5 x 4 mm   | 6. <b>S. sinaica</b>      |   |

1. **Scrophularia arguta** Sol. in Aiton, Hort. Kew., ed. 1, 2: 342 (1789).

Glandular-hairy annual 25-60 cm; stems erect, angled, simple or branched; leaves 2.5-5 x 2-4 cm, ovate, dentate-serrate, obtuse, subcordate at the base; flowers in leafy rigid



**Plate 18. SCROPHULARIACEAE:** *Schweinfurthia pedicellata* 1, flowering and fruiting branch. *Misopates orontium* 2, habit; fruiting branchlet (right). *Scrophularia arguta* 3, flowering and fruiting branch; basal leaf (right). *Scrophularia libanotica* 4, flowering and fruiting branch; basal part with leaves (right). *Scrophularia deserti* 5, flowering and fruiting branch; basal leaf (down left). *Scrophularia xanthoglossa* 6, flowering and fruiting branch; fruit and basal leaf (right). *Scrophularia sinaica* 7, flowering and fruiting branch; fruiting branchlet (right); fruit and basal leaf (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbis.

paniculate cymes, 6-12-flowered; pedicel 1.5-6 mm; calyx 2 mm, the lobes ovate, obtuse; corolla 5-6 mm, crimson; capsule 5-7 mm, ovate-conical, beaked; seeds 0.6 mm, tuberculate.

GE; hillsides. Southeast Egypt, Sudan, Ethiopia, Eritrea, Somalia, Socotra, Arabia.

2. **Scrophularia syriaca** Benth. in A. DC., Prodr. 10: 316 (1846).

Syn. *Scrophularia hypericifolia* Wydler, Mém. Soc. Hist. Nat. Genève 4: 166 (1828).

Glabrous low shrub 20-40 cm; stems rigid, much-branched, spreading; old branches spinescent; leaves 0.5-1.5 x 0.2-0.4 cm, spatulate, all alternate, fleshy, subsessile, entire; cymes 3-6-flowered, in a long lax panicle; bracts and bracteoles minute, scarious-margined; pedicel 1-2 mm; calyx-lobes 1.5-2 mm, broadly ovate, scarious-margined; corolla 4-5 mm, maroon; stamens 3 mm, included; staminode linear; capsule 3 x 3-4 mm, subglobose, mucronate; seeds 1.2-1.5 mm, oblong, alveolate.

De, S; sandy soils. Egypt, Palestine, Syria, Iraq, Arabia.

3. **Scrophularia libanotica** Boiss., Diagn. Pl. Orient., ser. 1, 12: 36 (1853).

Glabrous perennial, 20-40 cm; stems simple or branched; leaves 2-5 x 1.5-3 cm, broadly ovate, at least the lower opposite, subacute, dentate; petiole 1-2.5 cm, the upper leaves subsessile; cymes 2-7-flowered; bracteoles 1-3 mm; peduncle 1-2 cm; pedicel 1.2-3 mm; calyx-lobes 2 mm, broadly ovate, scarious-margined; corolla 4.5 mm, greenish to brownish-pink; stamens shortly exerted; staminode variable; capsule 3-4 mm, globular, apiculate.

S; moist rocky ground. Sinai, Palestine, Lebanon, Syria, Turkey, Caucasus, Iran.

4. **Scrophularia deserti** Delile, Descr. Egypte, Hist. Nat. 240, t. 33, f. 1 (1814).

Syn. *Scrophularia marginata* Boiss., Diagn. Pl. Orient., ser. 1, 4: 72 (1844).

Glabrous perennial 20-60 cm, woody at the base; stems numerous from the base; leaves 1-3(-4) x 0.8-1.5 cm, opposite, fleshy, obtusely dentate to shallowly lobed, white-margined; petiole 1-2.5 cm; lower leaves spatulate, petiolate, the upper short-petiolate or sessile, dentate; cymes many-flowered; peduncle 0.5-1.5 cm, bracts and bracteoles minute, scale-like; pedicel 0.5-1 mm; calyx-lobes 1.5-2 mm, white-margined; corolla 4-5 mm, deep red; staminode white, ovate; capsule 3-3.5 mm, subglobose, mucronate.

N (Rosetta), De, S; sandy desert wadis, edges of cultivation. Egypt, Palestine, Syria, Iraq, Arabia, Iran, Pakistan.

NOTE: The type of *Scrophularia deserti* was collected in Egypt "la vallée de l'Égarement", 26 January 1800, Delile.

5. **Scrophularia xanthoglossa** Boiss., Diagn. Pl. Orient., ser. 1, 12: 38 (1853).

Syn. *Scrophularia gileadensis* Post, J. Linn. Soc. London (Bot.) 24: 438 (1888).

Glabrous perennial 20-80 cm, woody at the base; stems erect, rigid, branched mainly from the base; leaves 3-6 cm; lower leaves opposite, petiolate, pinnatisect; lobes cuneate,



dentate; cymes 3-18-flowered; peduncle 0.5-2 cm; bracts and bracteoles small, linear, never white-margined, acute; pedicel 0.5-1.5 mm; calyx-lobes 2.5-3 mm, obovate, conspicuously white-margined; corolla 4-7 mm, purple; staminode ± orbicular; capsule 4 x 3 mm, subglobose, mucronate.

De, R, S; desert wadis. Egypt, southwest Asia.

6. **Scrophularia sinaica** Benth. in DC., Prodr. 10: 314 (1846).

Like *Scrophularia xanthoglossa*, but cymes 2-5 cm; peduncle 1-3 cm, rigid; 3-5-flowered; capsule 5 x 4 mm.

De, S; desert wadis. Egypt, Palestine, Lebanon, Syria, Iraq, Arabia.

NOTE: The type of *Scrophularia sinaica* was collected in Sinai, "in deserto Sinaico, Schimper 320 (holo, G; iso, M). This species was overlooked by previous authors working on the flora of Egypt probably due to its similarity to *Scrophularia xanthoglossa*.

7. **Scrophularia canina** L., Sp. Pl., ed. 1, 865 (1753).

Glabrous perennial 30-60 cm; stems erect, rigid, branched; leaves 2-6 cm, 1-pinnatisect; lobes oblong-linear, dentate, acute; cymes 5-8 cm, 5-20-flowered; peduncle 0.5-1 cm; bracts 3-4 mm, elliptic; pedicel 1-2 mm; calyx 2-2.5 x 1.5 mm, ovate, glabrous, the margins scarious; corolla 4-6 mm, purple; staminode linear to lanceolate, sometimes absent; capsule 4-5 x 3.5-4 mm, ± globose, mucronate; seeds *c.* 1 mm, ± oblong, black.

M (Mersa Matruh to Sollum); calcareous ridges. Central and southern Europe, North Africa.

8. **Anticharis** Endl.

Glandular-pubescent annuals or undershrubs; leaves alternate, entire; flowers solitary, axillary, pedicellate; calyx 5-lobed, the lobes narrowly lanceolate; corolla 5-lobed; tube much longer than the calyx, dilated above; lobes subequal, spreading; stamens 2, included; ovary 2-locular; capsule ovoid or cylindrical, acute; seeds numerous, small, ovoid or cylindrical, striate. 14 species, Africa, Arabia to India and Malaysia.

- |  |                         |
|--|-------------------------|
| 1. Leaves to 5 cm, linear, acuminate, subsessile; pedicel 1.2-2 cm   | 3. <b>A. linearis</b>   |
| + Leaves to 3 cm, ovate, elliptic, lanceolate or narrowly lanceolate, obtuse to acute; pedicel 3-8 mm                  | 2                       |
| 2. Leaves to 1.5 cm, ovate, elliptic or narrowly lanceolate, obtuse to subacute; capsule 1½ times as long as the calyx | 1. <b>A. glandulosa</b> |
| + Leaves to 3 cm, lanceolate to narrowly elliptic, obtuse; capsule 2 times as long as the calyx                        | 2. <b>A. arabica</b>    |

1. **Anticharis glandulosa** Asch., Monatsber. Königl. Akad. Wiss. Berlin 1866: 880 (1866).

Densely glandular-hairy annual, 10-25 cm; stems erect, branched; leaves 0.6-1.5 x 0.3-0.6 cm, ovate, elliptic or narrowly oblanceolate, obtuse to subacute, attenuate at the

base, petiolate; pedicel 3-5 mm; bracteoles 1 or 2, minute, or 0; calyx-lobes 4-5 x 1 mm, elliptic-oblongate, subacute; corolla c. 1 cm, blue; capsule 8-9 x 3 mm, narrowly ovoid, attenuate at the apex; seeds 0.5 mm, cylindrical, striate, yellowish-brown.

De, R, GE, S; sandy wadis and desert plains. Egypt, Sudan, Somalia, Niger, Arabia to India.

## 2. *Anticharis arabica* Endl., Nov. Stirp. Dec. 23 (1839).

Densely glandular-hairy annual, 10-30 cm; stems erect, branched; leaves 1-3 x 0.2-0.4 cm, lanceolate to narrowly elliptic, obtuse, attenuate at the base, short-petiolate; pedicel 3-8 mm; bracteoles 1 or 2, minute or 0; calyx-lobes 3 x 1 mm, elliptic, obtuse; corolla 6-7 mm, bluish-lilac, the throat white; capsule 8-9 x 3-4 mm, narrowly ovoid, attenuate at the apex; seeds 0.8 mm, cylindrical, striate, yellowish-brown.

De, GE; sandy desert wadis and plains. Egypt, Sudan, Arabia.

## 3. *Anticharis linearis* (Benth.) Hochst. ex Asch., Monatsber. Königl. Akad. Wiss. Berlin 1866: 882 (1866).

Glandular-hairy annual 10-45 cm; stems erect, branched; leaves 1.5-5 x 0.1-0.3 cm, sessile, linear, acuminate, attenuate at the base; pedicel 1.2-2 cm; bracteoles 2, 1-1.5 mm, subulate; calyx-lobes 4-5.5 x 1 mm, narrowly lanceolate, acuminate; corolla 1-1.2 cm, tubular, purplish-blue; capsule c. 1 cm, narrowly ovoid, attenuate at the apex; seeds 0.6 mm, cylindrical, striate; yellowish.

De, R, GE; sandy desert wadis and plains. Egypt, Sudan, tropical East and South Africa, Namibia, Arabia, India.

## 9. *Lindenbergia* Lehm.

Annuals or perennials, rarely low shrubs; leaves opposite, the upper sometimes alternate; calyx tubular or campanulate, unequally 5-lobed; corolla bilabiate, longer than the calyx, bicoloured; stamens 4, didynamous, included; style filiform; capsule oblong to ovoid, dehiscent loculicidally by 2 valves; seeds numerous, minute. About 15 species, Old World tropics.

### 1. *Lindenbergia indica* (L.) Vatke, Österr. Bot. Zeitschr. 25: 10 (1875).

Syns. *Bovea sinaica* Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 253 (1834).

*Lindenbergia sinaica* (Decne.) Benth., Scroph. Ind. 22 (1835).

*Lindenbergia abyssinica* Hochst. ex Benth. in DC., Prodr. 10: 377 (1846).

Glandular-hairy low shrub 20-50 cm; stems erect, with spreading branches; leaves 1-3 x 0.5-2 cm, broadly ovate, dentate, subacute, rounded or truncate at the base; petiole 1-2 mm; bracts 0.5-8 x 0.3-0.4 cm, leaf-like, dentate, acute, sessile; flowers in long lax spike-like racemes; calyx 5-6 mm, the lobes c. 1 mm, triangular, acute; corolla 1-1.2 cm, yellow and orange-yellow, bearded at the throat; capsule 8-9 x 3 mm, narrowly ovoid, acute, glandular-hairy.

D, R, GE, S; stony wadis and hillsides. Egypt, Palestine, Arabia, India, tropical East Africa, Ethiopia.



**Plate 19. SCROPHULARIACEAE:** *Anticharis glandulosa* 1, habit. *Anticharis arabica* 2, habit. *Anticharis linearis* 3, flowering and fruiting branch. *Lindenbergia indica* 4, flowering and fruiting branch. *Jamesbritennia dissecta* 5, flowering and fruiting branch. *Bacopa monnieri* 6, flowering branchlet rooting at the nodes; fruiting branchlet (up). *Peplidium maritimum* 7, prostrate stem rooting at the nodes; fruiting branchlet (right). *Limosella aquatica* 8, habit. All drawings to the same scale, except the enlarged part (scale given). Drawn by Margaret Tebbs.

## 10. *Jamesbrittenia* Kuntze

Literature: Hilliard, O. H. 1994. The Manuleae, a tribe of Scrophulariaceae: *Jamesbrittenia* 84-212. Edinburgh Univ. Press.

Shrubs, perennials or annuals, glandular, aromatic; stems leafy; leaves opposite, often the upper alternate, simple or deeply divid. inflorescence racemose; flowers solitary in the leaf axils; bracts very rarely present; calyx 5-lobed almost to base,  $\pm$  regular, pubescent; corolla-tube cylindric, abruptly expanded near apex; limb  $\pm$  regular to distinctly bilabiate; lobes spreading; stamens 4, didynamous; stigma minutely 2-fid, included; ovary  $\pm$  deltoid, usually glandular; fruit a septicidal capsule, with a short loculicidal split at tip of each valve; seeds each seated on a round, centrally depressed pulvinus. 83 species, mainly Africa from Angola and Zambia southwards, 1 species (*J. dissecta*) from Egypt and Sudan to the Indian subcontinent.

### 1. *Jamesbrittenia dissecta* (Delile) Kuntze, Rev. Gen. Pl. 2: 461 (1891).

Syns. *Capraria dissecta* Delile, Descr. Egypte, Hist. Nat. 95, t. 32, f. 3 (1814).

*Sutera glandulosa* Roth, Nov. Pl. Spec. 291 (1821).

*Sutera dissecta* (Delile) Walp., Repert. 3: 271 (1844).

*Chaenostoma dissecta* (Delile) Thell., Vierteljahrss. Nat. Ges. Zürich 74: 116 (1929).

Glandular-pubescent annual 5-35 cm; stems branched from the base, erect, prostrate or ascending, leafy; leaves 0.6-4 x 0.5-2 cm. opposite, pubescent on both surfaces, the upper alternate, elliptic, acute, deeply divided. lobes oblong, toothed; leaves tapering into a petiole 0.2-2 mm; flowers solitary in the axils of the upper leaves; pedicel 0.3-1.2 cm; calyx-tube 0.1-0.3 mm; calyx-lobes 1.5-3.5 x 0.5-1 mm, oblong-spathulate, glandular-pubescent; corolla-tube 2.5-4 mm cylindric; limb 2-4 mm diam.; stamens included, or anthers just visible in throat; stigma 0.1-0.2 mm, often attached to anthers; style 1-1.5 mm; ovary 1.2-1.5 x 1 mm, glandular-pubescent; capsule 3.5-5 x 2-3 mm, glandular-pubescent; seeds 0.2-0.4 x 0.2-0.3 mm.

N; Nile banks. Egypt, Sudan, India.

NOTE: Syntypes of *Capraria dissecta* were collected in Egypt: "les îles sablonneuses du Nil, au Kaire; haute Egypte; champs marécageux, ensemencés à deux lieues de Belbeys, 15 février 1801", Delile s.n. (P).

### 11. *Bacopa* Aublet, nom. conserv.

Literature: Philcox, D. 1979. Clarification of the name *Bacopa monnieri* (Scrophulariaceae). Kew Bull. 33(4): 679-680.

Annuals, erect, prostrate, decumbent or floating, mostly glabrous; leaves opposite, entire or dentate to crenate, capillary-divided in aquatic species; flowers solitary, axillary, pedicellate or sessile, bracteate or ebracteate; calyx 5-partite; sepals imbricate, unequal; corolla bilabiate, exceeding the calyx; upper lip 2-lobed or emarginate, the lower 3-lobed; stamens 4, didynamous, included; capsule ovoid or globose, 2- or 4-loculicidal or septicidal; seeds numerous, small. 56 species, warm regions, but especially America.

### 1. *Bacopa monnieri* (L.) Pennell, Proc. Acad. Nat. Sci. Philad. 98: 94 (1946).

Syn. *Lysimachia monnieri* L., Cent. Pl. 2, no. 120 (1756).

Glabrous perennial; stems 10-25 cm, creeping, rooting at nodes, simple, rarely branched; leaves 0.5-1.8 x 0.2-0.5 cm, spatulate-oblong, entire, obtuse, subsessile; flowers solitary, axillary; pedicel 0.5-2.5 cm, bracts 3-4 x 1.5 mm; calyx with posterior lobes 4-6 x 2-3 mm, oblong; anterior lobes 4 x 2.5 mm, ovate; corolla 6-8 mm, 5-lobed, lilac, the lobes subequal; capsule 4 x 2.5 mm, ovoid.

N, De, S; moist ground, ditches. Tropical and subtropical regions.

## 12. *Peplidium* Delile

Creeping or prostrate annuals; leaves opposite; flowers very small, axillary, ebracteolate; calyx 5-lobed, tubular, 5-angled; corolla-tube short, included in the calyx; lobes  $\pm$  equal; stamens 2, the filaments dilated at the base; anthers 1-celled; style short, dilated upwards into a spatulate lamina curved over the stamens; capsule globose or ovoid, indehiscent or irregularly dehiscent. About 10 species, warm and tropical Old World.

1. *Peplidium maritimum* (L.f.) Asch. in Schweinf. & Asch., Beitr. Fl. Aethiop. 275 (1867).

Syns. *Hedyotis maritima* L.f., Suppl. Pl. 9 (1781).

*Oldenlandia maritima* (L.f.) Roth, Nov. Pl. Sp. 97 (1787).

*Peplidium humifusum* Delile, Descr. Egypte, Hist. Nat. 148 (1814).

Aquatic annual 5-10 cm; stems prostrate, rooting at the nodes; leaves 0.6-1.8 x 0.3-0.8 cm, ovate, obovate or elliptic, obtuse, entire, attenuate to a petiole 1-2 mm; petioles of opposite leaves connected by their membranous margins; flowers subsessile in the leaf axils; calyx 2-2.5 mm, with 5 prominent ridges and membranous between them; calyx-lobes c. 1 mm, obtuse; corolla shorter than the calyx, the lobes short and rounded; filaments thick at the base; capsule c. 2.75 mm, globose, enclosed by the persistent calyx, indehiscent or tardily and irregularly dehiscent.

N (Damietta), S; rice fields, ditches. Tropical and subtropical Africa and Asia.

## 13. *Limosella* L.

Small glabrous, tufted, creeping or floating aquatic or marsh herbs; stemless or with stolon-like stems rooting at the nodes; leaves radical, rarely alternate on stems, petiolate, erect or floating, linear, spatulate or oblong-ovate; peduncle axillary, ebracteate; flowers small; calyx campanulate, (4-)5-lobed, persistent; corolla tubular, campanulate; limb 5-lobed, spreading; stamens 4, didynamous, usually exerted; fruit a 2-valved capsule, loculicidally dehiscent; seeds numerous, striate, rugose. About 11 species, mainly cooler regions, also in tropical mountains.

1. *Limosella aquatica* L., Sp. Pl., ed. 1, 631 (1753).

Glabrous tufted, aquatic or marsh annual, 5-10 cm, often producing stolons with one or more tufts of leaves and rooting at nodes; leaves usually in erect tufts, sometimes alternate on branches; blade 0.3-2 x 0.1-1 cm, spatulate or oblong-linear; petiole 1-6 mm; flowers axillary, solitary; peduncle 0.2-2 cm, often deflexed in fruit; calyx 2 mm, the lobes apiculate; corolla 3 x 2 mm, lilac; capsule 2.5 mm, subglobose; seeds ellipsoid.

N; muddy margins of lakes, ditches and streams. Cosmopolitan.

## 14. *Veronica* L.

Literature: Chrtěk, J. & Osbornová-Kosinová, J. 1981. *Veronica* sect. *Beccabunga* in Egypt. *Folia Geobot. Phytotax.*, Praha, 16: 423-437.

Annuals or perennials, glabrous or pubescent; stems erect, prostrate or decumbent; leaves opposite, occasionally whorled or alternate, entire, dentate or crenate; flowers in terminal or axillary racemes or solitary and axillary, bracteate; pedicels ebracteate; calyx 4-5-lobed; corolla rotate, 4-5-lobed, mostly blue, rarely white, pink or lilac; stamens 2, exserted, inserted on the corolla-tube; capsule compressed or turgid, 2-sulcate, loculicidal; seeds few or many. About 250 species, north temperate regions, a few on tropical mountains.

- |   |  |
|---|--|
| 1. Floral and cauline leaves similar; flowers solitary in the leaf axils  | 2  |
| + Floral leaves much reduced, differing in shape and size from cauline leaves; flowers in lateral or terminal racemes   | 3  |
| 2. Pedicel c. 1 cm, ± equalling the subtending leaf; corolla bright blue; capsule 4-5 mm diam., lobes slightly divergent  | 1. <i>V. polita</i>                                    |
| + Pedicel 1.5-2.8 cm, much longer than the subtending leaf; corolla blue and white; capsule 7-8 mm diam., lobes strongly divergent                                | 2. <i>V. persica</i>                                   |
| 3. Annual, usually not exceeding 20 cm  | 4  |
| + Perennial, usually more than 20 cm  | 7  |
| 4. Pedicel in fruit 4-5 times as long as the calyx  | 3. <i>V. syriaca</i>                                   |
| + Pedicel in fruit 1-2 times as long as the calyx   | 5  |
| 5. Calyx in fruit 5-7(-9) mm, much exceeding the capsule; corolla 3-4 mm diam.  | 4. <i>V. biloba</i>                                    |
| + Calyx in fruit 2.5-5 mm, equalling or shorter than the capsule; corolla 4-5 mm diam.  | 6  |
| 6. Corolla pale blue; capsule densely glandular-hairy, lobes not divergent; style included in the sinus   | 5. <i>V. campylopoda</i>                               |
| + Corolla white tinted with pink, rarely pale blue or lilac; capsule sparsely glandular-hairy or glabrescent, lobes slightly divergent; style exceeding the sinus | 6. <i>V. rubrifolia</i> subsp. <i>respectatissima</i>  |
| 7. Flowers 2.5-3.5 mm diam.; capsule 2-2.5 x 1.3-2 mm, elliptic   | 9. <i>V. anagalloides</i> subsp. <i>taeckholmiorum</i> |
| + Flowers 4-6 mm diam.; capsule 3.5-4 x 2.5-3.5 mm, orbicular to ovate-elliptic   | 8  |
| 8. Leaves petiolate, the uppermost sessile or subsessile; racemes alternate   | 9  |
| + Leaves sessile, the lowermost sometimes short-petiolate; racemes opposite   | 10   |
| 9. Capsule acute  | 7. <i>V. kaiseri</i>                                   |
| + Capsule rounded   | 10. <i>V. scardica</i> subsp. <i>africana</i>          |
| 10. Racemes dense; pedicel in fruit 4-8 mm  | 8. <i>V. anagallis-aquatica</i>                        |
| + Racemes lax; pedicel in fruit 0.6-1.2 cm  | 11. <i>V. catenata</i> subsp. <i>pseudocatenata</i>    |

1. **Veronica polita** Fr., Nov. Fl. Suec. 63 (1819).

Syn. *Veronica didyma* sensu auct.

Pubescent annual 5-20 cm; stems branched mainly from the base, ascending or decumbent; leaves 0.6-1.2 x 0.5-1 cm, broadly ovate, crenate-serrate, subcordate or truncate at the base, all petiolate; flowers solitary in the leaf axils; pedicel c. 1 cm, ± equalling the subtending leaf, recurved in fruit; calyx-lobes 3.5-4 x 2-2.5 mm, ovate, obtuse to subacute, prominently veined in fruit; corolla 6-8 mm diam., bright blue; capsule 4-5 mm diam., glandular-tomentellous; style exceeding the sinus; seeds 1.5 mm, boat-shaped, rugulose.

N, O, M; weed of cultivation. Temperate Europe, North Africa, Asia, naturalized in many temperate regions.

2. **Veronica persica** Poir. in Lam., Encycl. 8: 542 (1808).

Syn. *Veronica buxbaumii* Ten., Fl. Nap. 1: 7, t. 1 (1811).

Annual 15-40 cm, pubescent with crispate hairs; stems branched from the base; leaves 0.5-1.2 x 0.4-1 cm, broadly ovate to elliptic, crenate-serrate, subcordate at the base, all petiolate; flowers solitary in the leaf-axils; pedicel 1.5-2.8 cm, much longer than the subtending leaf; calyx-lobes 4-5 x 2-2.5 mm, in pairs, ovate, pubescent, prominently veined and divaricate in fruit; corolla c. 1 cm diam., blue and white; capsule 7-8 mm diam., twice as broad as long; lobes strongly divergent, reticulately-veined, pubescent; style exceeding the sinus; seeds 1.5-2 mm, boat-shaped, rugose, yellowish.

M; gardens, orchards, fields. Europe, North Africa, southwest to Central Asia, Japan, North America, New Zealand; probably native to western Asia.

3. **Veronica syriaca** Roem. & Schult., Syst. Veg. 1: 116 (1817).

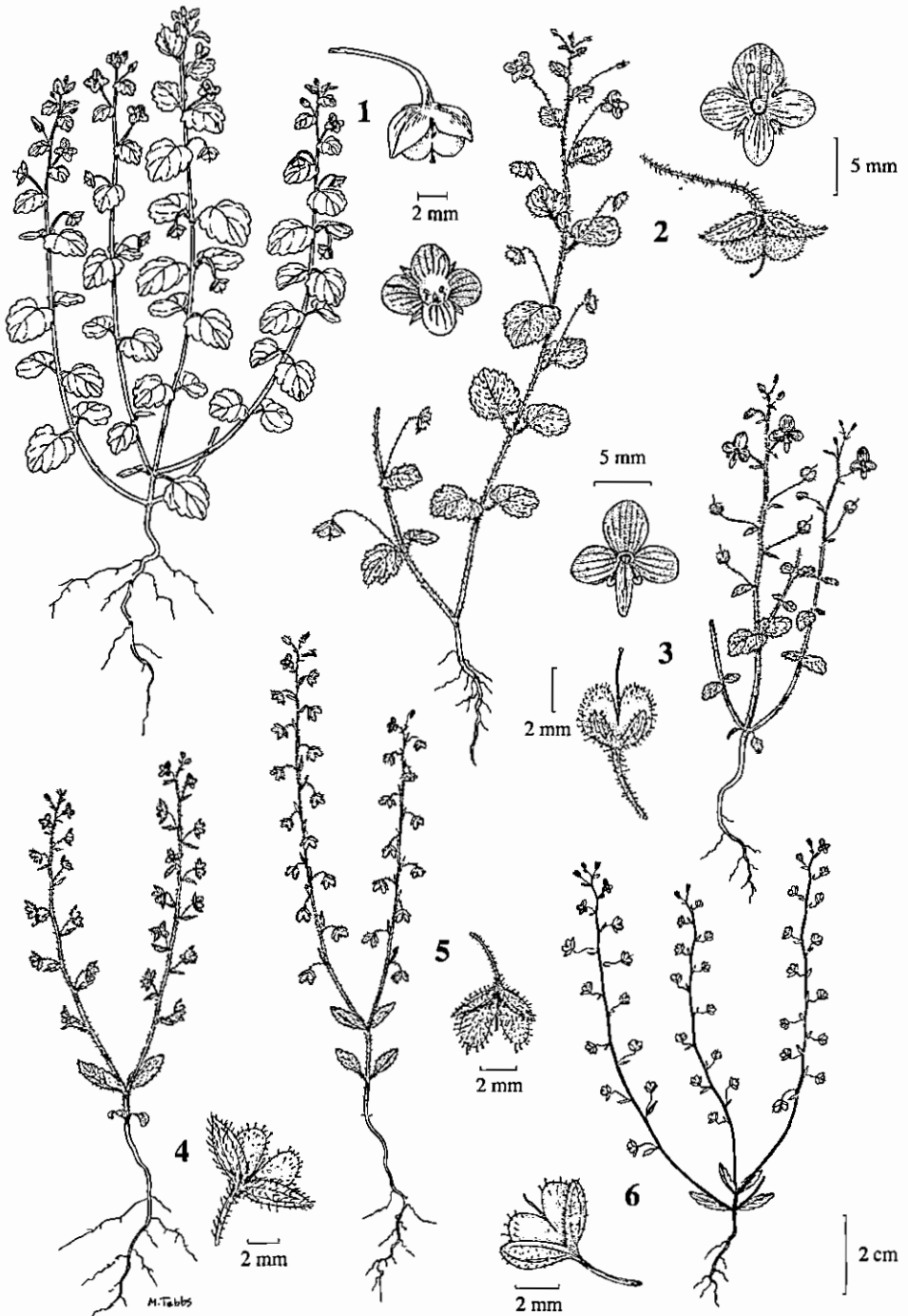
Glandular-hairy annual 10-30 cm; stems branched from the base; leaves 1-2 x 0.5-1 cm, broadly ovate, crenate-dentate, rounded at the base, mostly sessile, the lowermost short-petiolate; flowers in lax terminal racemes; pedicel in fruit 4-5 times as long as the calyx; calyx-lobes 2-2.5 x 1 mm, oblong-ovate; corolla c. 1 cm diam., sky-blue, the lower lobe white and narrow; capsule 3-4 mm diam., 2-2.5 mm long, compressed; lobes ovate, obtuse; style twice as long as the sinus; seeds 1 mm, ovate, rugulose.

M; cultivated ground. East Mediterranean region.

NOTE: The occurrence of *Veronica syriaca* in Egypt needs confirmation by acquiring new collections.

4. **Veronica biloba** Schreb. in L., Mant. Alt. 172 (1771).

Sparsely pubescent annual 5-12 cm; leaves 0.8-2 x 0.3-1.2 cm, ovate-lanceolate, remotely serrate, acute; petiole 1-2 mm; flowers in terminal racemes; bracts 4-6 x 1 mm, narrowly lanceolate; pedicel 5-8 mm in fruit; calyx-lobes 5-7(-9) x 2.5-3.5 mm in fruit, much exceeding the capsule, ovate, acute, connate at the base in pairs, the margin and veins puberulent; corolla 3-4 mm diam., blue; capsule 3.5-4 x 4-5.5 mm, 2-lobed, the lobes not divergent, puberulent; style 0.5-1 mm, included in the sinus; seeds c. 2 mm, yellow, reticulate-rugose.



**Plate 20. SCROPHULARIACEAE:** habit of: *Veronica polita* 1, flower and fruit (right). *Veronica persica* 2, flower and fruit (right). *Veronica syriaca* 3, flower and fruit (left). *Veronica biloba* 4, fruit (down right). *Veronica campylopoda* 5, fruit (right). *Veronica rubrifolia* subsp. *respectatissima* 6, fruit (down left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.



S; in the mountains. Sinai, Turkey, Caucasus, Iran, Central Asia, Himalayas.

NOTE: The occurrence of *Veronica biloba* in Egypt is doubtful. The above description is based on material from Turkey.

5. *Veronica campylopoda* Boiss., Diagn. Pl. Orient., ser. 1, 4: 80 (1844).

Glandular-hairy annual 5-15 cm; stems branched from the base; leaves 0.8-2 x 0.3-0.8 cm, oblong-lanceolate, obscurely serrate or entire; flowers in lax racemes; bracts 3-6 x 1 mm, linear-lanceolate; pedicel 3-6 mm in fruit, recurved; calyx-lobes 3.5-4 x 1 mm, connate at the base in pairs, ovate-lanceolate, acute, 3-veined; corolla c. 4 mm diam., pale blue; capsule 3 x 4 mm, compressed, densely glandular-hairy, the lobes not divergent; style included in the sinus; seeds 1.2 mm, boat-shaped, rugulose.

S; in the mountains. Sinai, Palestine, Syria, Turkey, Armenia, Iran, Afghanistan, Central Asia.

NOTE: The type of *Veronica campylopoda* was collected in Sinai in 1835, Schimper 118 (M).

6. *Veronica rubrifolia* Boiss., Diagn. Pl. Orient., ser. 1, 12: 46 (1853)

subsp. *respectatissima* M. A. Fisch., Fl. Iranica 147, 1: 71, t. 48 (1981).

Syns. *Veronica pseudodivariata* Parsa, Kew. Bull. 1948: 222 (1948).

*Veronica iranica* Rech. f., Anz. Math.-Nat. Kl. Oesterr. Akad. Wiss. 87: 191 (1950).

*Veronica accessoria* Rech. f., Anz. Math.-Nat. Kl. Oesterr. Akad. Wiss. 87: 192 (1950).

*Veronica islensis* E. Gamal-Eldin, Sendtnera 1: 242 (1993).

Annual 3-15 cm; stems erect or ascending, terete, purple-violet, glabrous or sparsely pilose; leaves 0.5-1.5 x 0.2-0.6 cm, oblong-ovate to elliptic, crenate-serrate, sparsely pubescent, short-petiolate; flowers in terminal racemes 5-20-flowered; pedicel in fruit 3.5-7.5 mm; bracts 1-2 mm, elliptic; calyx-lobes in fruit 2.5-4 x 1-2 mm, 3-nerved, obtuse; corolla 3-4 mm diam., white tinted with pink, rarely pale blue or lilac; capsule 2.5-3 x 3-4 mm, compressed, sparsely glandular-hairy or glabrescent, the lobes slightly divergent; style exceeding the sinus; seeds 1.5 x 1 mm, yellowish.

S; moist ground by wells or springs. Sinai, northern Iraq, Iran, Afghanistan, Pakistan, Tadjikistan.

NOTE: The identity of this taxon has been long confused with other species. A specimen collected by J. R. Shabetai 503 from Mt St Katherine, Sinai, 16 April 1937 (CAIM, K), as *Veronica macropoda* Boiss., was later identified to *Veronica rubrifolia* subsp. *respectatissima* by Britt Snogerup in 1986. Täckholm, Stud. Fl. Egypt, ed. 2, 498 (1974) enumerated *Veronica macropoda* from Sinai, although it is indeed endemic to Iran, according to Fischer *et al.* in Rechinger f. (ed.), Fl. Iranica, Scrophulariaceae 1: 74 (1981). The recently described *Veronica islensis* from Sinai is identical to *Veronica rubrifolia* subsp. *respectatissima* and is listed here as a synonym.

7. *Veronica kaiseri* Täckh., Svensk Bot. Tidskr. 36: 250 (1942).

Syn. *Veronica musa* Täckh. & Hadidi, Bull. Soc. Geogr. Egypte 40: 151 (1969).

Glabrous perennial 10-30 cm; stems erect or ascending, rooting at the lower nodes; leaves 1-2.5 x 0.8-1.8 cm, broadly ovate to broadly elliptic, obtuse, rounded at the base; lower leaves short-petiolate, petiole 1-2 mm; upper leaves sessile; flowers in axillary, alternate few-flowered racemes; pedicel 2-8 mm; bracts 3-4 mm, linear-lanceolate; sepals 2.5-3.5 mm, lanceolate, acute; corolla 3-4 mm, bright blue; capsule 3-3.5 mm, acute, ± equalling the calyx-lobes; seeds 0.8 mm, ovoid, smooth.

S; moist ground in the vicinity of wells. Endemic.

NOTE: Syntypes of *Veronica kaiseri* were collected in Sinai: Wadi Bedr, 19 April 1891, A. Kaiser *s.n.* (G); Siq (Sheikh) Umm Hassun, Shideq, 9 Sept. 1926, A. Kaiser 538 (G, S); Wadi Feiran, Boissier *s.n.* (G); Wadi El Lega, May 1939, M. Drar 453 (CAIM).

#### 8. *Veronica anagallis-aquatica* L., Sp. Pl., ed. 1, 12 (1753).

Glabrous perennial 15-60 cm; stems erect or ascending, rooting at the lower nodes, tetragonal; leaves 1.5-4 x 1-2 cm, ovate-lanceolate, serrulate or entire, sessile, clasping; racemes axillary, many-flowered, dense; bracts 2-4 x 0.5 mm, subulate; pedicel 4-8 mm in fruit, slender; calyx-lobes 2.5-3 x 1 mm, ovate, acute; corolla 2-3 mm, pale pinkish-blue; capsule 2.5-3 mm, suborbicular, the apex shallowly emarginate; seeds 0.5 mm, oblong-elliptic, compressed, yellowish-brown.

N, O; irrigation canals. Europe, Africa, Asia, temperate America.

#### 9. *Veronica anagaloides* Guss., Pl. Rar. 5, t. 3 (1826) subsp. **taeckholmiorum** Chrtek & Osb.-Kos., Folia Geobot. Phytotax. 16: 426 (1981).

Annual or short-lived perennial, 15-50 cm, glabrous or rarely pilose-glandular; stems erect, simple, rooting at the lower nodes; leaves 3-5.5 x 0.6-1.2 cm, linear-lanceolate, entire, subacute, sessile, cordate and clasping at the base; flowers in opposite racemes 3-7 (-15) cm, many-flowered, dense; pedicel 1-3 mm; bracts 2-4(-8) mm, linear; calyx-lobes 1.5-2 x 0.6 mm, elliptic, obtuse; corolla 2.5-3.5 mm diam., blue or pale violet; capsule 2-2.5 x 1.3-2 mm, elliptic; style 1-1.2 mm, much exceeding the sinus.

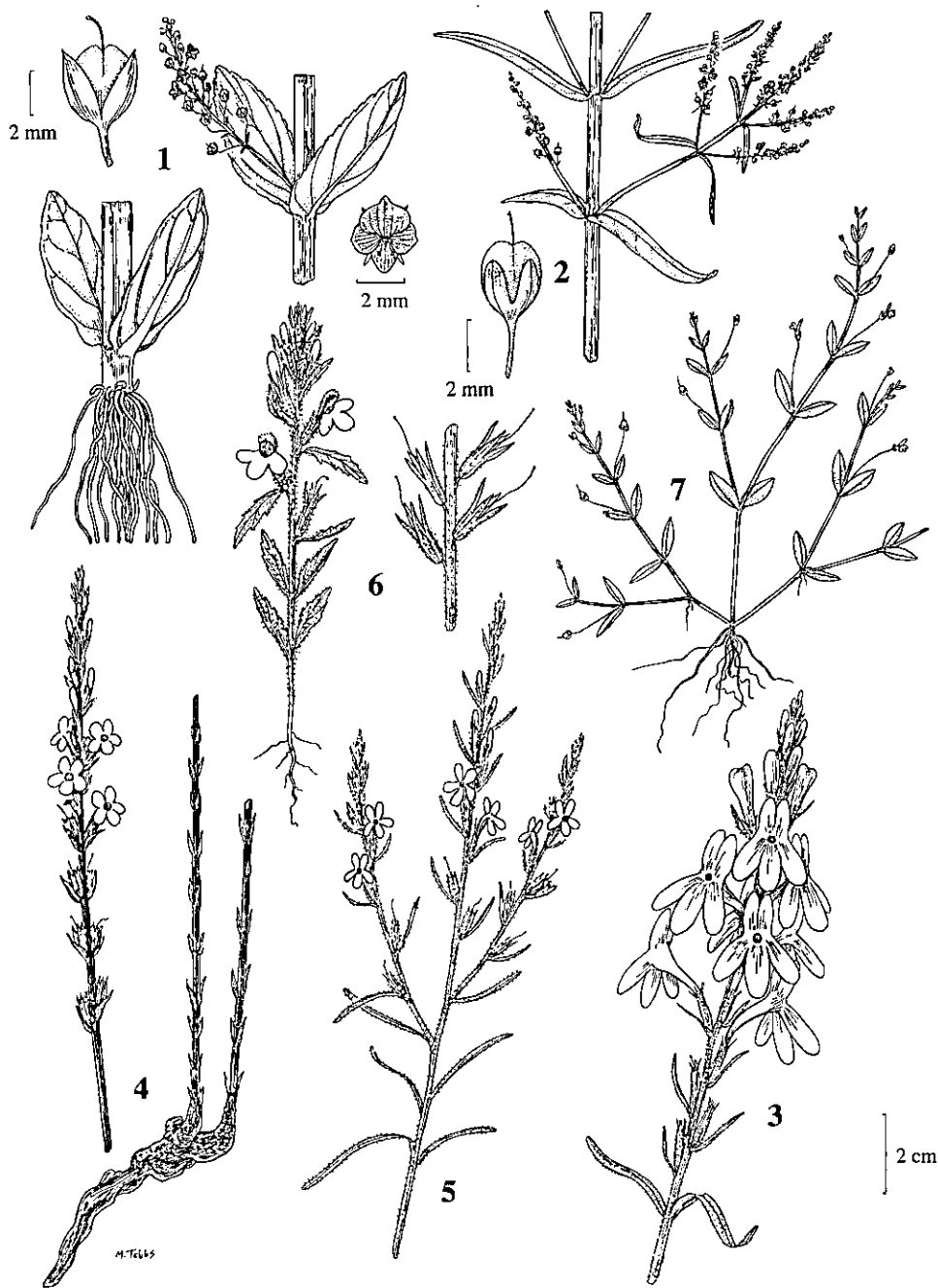
N; irrigation canals, ditches. Endemic.

NOTE: The type of *Veronica anagaloides* subsp. *taeckholmiorum* was collected in Behtim (Bahtim) near Cairo, 4 April 1977, Chrtek, Kosinová & Slaviková *s.n.* (PRC).

#### 10. *Veronica scardica* Griseb., Spicil. Fl. Rumel. 2: 31 (1844) subsp. **africana** Chrtek & Osb.-Kos., Folia Geobot. Phytotax. 16: 433 (1981).

Perennial 15-25(-35) cm; stems ascending, rooting at the lower nodes; leaves 1.5-2.5 x 0.6-1.4 cm, ovate-elliptic, acute, rarely subacute or obtuse; lower leaves petiolate, the upper sessile or subsessile; flowers in alternate, lax, glabrous or sparsely pilose-glandular racemes to 20 cm; pedicel 0.6-1.2 cm, patent; bracts 0.5-1(-1.7) cm; flowers 4-5 mm diam., calyx-lobes closely appressed to the capsule; corolla pale blue or pinkish; capsule 2.5-3.5 mm, rounded.

N, O; moist ground, canal banks, ditches. Egypt, Sudan.



**Plate 21. SCROPHULARIACEAE:** *Veronica anagallis-aquatica* 1, flowering and fruiting branchlet; flower (right); fruit (up left); basal part with leaves and roots (down left). *Veronica anagalloides* 2, flowering branch; fruit (down left). *Striga hermonthica* 3, flowering and fruiting branch; basal part (right). *Striga gesnerioides* 4, flowering and fruiting branchlet (right). *Lindernia parviflora* 7, habit. *Parentucellia viscosa* 6, habit; fruiting branchlet (right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

NOTE: The type of *Veronica scardica* subsp. *africana* was collected in Kharga Oasis, 11 February 1931 by Sabet *s.n.* (PRC).

11. *Veronica catenata* Pennell, *Rhodora* 23: 37 (1921) subsp. *pseudocatenata* Chrtek & Osb.-Kos., *Folia Geobot. Phytotax.* 16: 430 (1981).

Glabrous perennial 30-60 cm; stems ascending; leaves 3-4.5 x 1.5-2.5 cm, sessile, linear-lanceolate, dentate, acute, rarely obtuse, cordate-amplexicaul at the base; pedicel in fruit 0.6-1.2 cm; bracts 4-7 mm, lanceolate; flowers *c.* 5 mm diam., in opposite lax racemes 6-10 cm; calyx-lobes patent or deflexed in fruit; corolla pink; capsule 2.8-3.2 mm, rounded.

N, O, R; moist ground, canal banks. Endemic.

NOTE: The type of *Veronica catenata* subsp. *pseudocatenata* was collected in Cairo, 27 March 1974 by Zouhar *s.n.* (PR).

15. *Striga* Lour.

Annual, rarely perennial root-parasites, hirsute or scabrous; fine adventitious roots terminated by small haustoria; stems erect, stiff, usually quadrangular, ridged; leaves opposite or nearly so, sessile or subsessile, reduced to small scales near the base of the stem; inflorescence a spike; flowers in the axils of bracts or in dense heads; bracts leaf-like or reduced; bracteoles 2; calyx tubular, 5-lobed or with 5 (rarely 4) teeth; corolla with a narrow tube and expanded bilabiate limb; stamens 4, didynamous; anthers 1-locular; pistil tubular; ovules numerous, minute; capsule cylindrical or subovoid, loculicidal; style usually persistent; seeds minute, with prominent encircling ridges. About 40 species, Old World tropics to South Africa.

- |   |                           |
|---|---------------------------|
| 1. Flowers to 3.5 cm; corolla pink                        | 1. <i>S. hermonthica</i>  |
| + Flowers to 1.5 cm; corolla red, purple, white or yellow | 2                         |
| 2. Plant similar to <i>Orobanche</i> ; leaves scale-like  | 2. <i>S. gesnerioides</i> |
| + Plant with green leaves                                 | 3. <i>S. asiatica</i>     |

1. *Striga hermonthica* (Delile) Benth. in Hook., *Comp. Bot. Mag.* 1: 365 (1836).  
Syn. *Buchnera hermonthica* Delile, *Descr. Egypte, Hist. Nat.* 245, t. 34, f. 3 (1814).

Rigid scabrous annual 20-50 cm, bluish-green; stems erect, much-branched, quadrangular, grooved on each face; leaves 4-8 x 1-1.5 cm, thick, scabrous, hispid along the margins; flowers 2.5-3.5 cm; corolla pink, fragrant; bracts 1-1.3 x 0.15-0.25 cm, acuminate, the margins with hispid hairs; bracteoles 4-5 mm; calyx 1-1.2 x 0.2 mm; corolla-tube 1.2-2 cm, bent just above the calyx-teeth, sparsely hairy outside; upper lobe emarginate; capsule 1.2-1.5 x 0.2-0.25 cm; seeds numerous.

N; on native and cultivated grasses, especially sugar-cane. Widespread in dry regions of tropical Africa, Madagascar and Arabia.

NOTE: The type of *Buchnera hermonthica* was collected in Kom-Ombo (Hermonthis), Upper Egypt, Delile *s.n.* (MPU).

2. **Striga gesnerioides** (Willd.) Vatke, Österr. Bot. Zeitschr. 25: 11 (1875).

Syns. *Buchnera gesnerioides* Willd., Sp. Pl., ed. 4, 3: 338 (1800).

*Buchnera orobanchoides* R. Br. in Endl. Österr. Bot. Zeitschr. 2: 388, t. 2 (1832).

*Striga orobanchoides* (R. Br.) Benth. in Hook., Comp. Bot. Mag. 1: 361, t. 19 (1836).

Greenish-yellow annual 10-25 cm, similar to *Orobanche* in appearance; stems usually branched from the base, quadrangular, purplish; leaves 0.5-1 x 0.2-0.3 cm, scale-like, appressed to the stem, ovate-lanceolate, acute or acuminate, puberulent; flowers opposite or alternate, usually 2 per node; bracts 3-5 mm, acuminate; bracteoles minute; calyx 4-6 x 1.5-2 mm; teeth 1-1.5 mm, triangular, acute; corolla 1.2-1.5 cm, purple, upper lobes 2-2.5 mm, sharply curved, the lower 3-3.2 mm; capsule 4-5 x 3 mm, ovoid; seeds numerous.

O (Kharga); on various legume species. Tropical Africa and Asia.

3. **Striga asiatica** (L.) Kuntze, Revis. Gen. 2, 466 (1891).

Syns. *Buchnera asiatica* L., Sp. Pl., ed. 1, 630 (1753).

*Striga lutea* Lour., Fl. Colchinch. 22 (1790).

Hispid annual 15-25 cm; stems erect, branched, quadrangular; leaves 1-1.8 x 0.1-0.2 cm, linear, green; flowers opposite or alternate; bracts 1-1.5 cm; bracteoles 1.5-2 mm; calyx 6-8 x 2 mm; teeth c. 2 mm, subulate, acuminate; corolla 1-1.2 cm, red, yellow or white, the tube bent near the limb; upper lobe of limb 4 mm, emarginate, the lower spreading; capsule 4-5 x 2-2.5 mm, ovoid; seeds numerous.

N (Abu Zaabal, near Cairo), M; on maize. Tropical and southern Africa, Madagascar, Arabia to India and China, introduced into North America.

16. **Parentucellia** Viv.

Syn. *Eufragia* Griseb.

Viscid root-hemiparasitic annuals; stems erect, tetragonal; leaves opposite or alternate, sessile or subsessile, simple, dentate or serrate; flowers in spike-like leafy racemes; calyx tubular, 4-lobed; corolla tubular, bilabiate, the upper lip entire or emarginate, hooded; lower lip 3-lobed, the lobes rounded; palate convex; stamens 4, didynamous; anthers mucronate; capsule oblong to lanceolate, slightly compressed, dehiscing by 2 valves; seeds numerous, minute, smooth or reticulate, with a basal hilum. 4 species, western Europe, Mediterranean region to Iran and Central Asia.

1. **Parentucellia viscosa** (L.) Caruel in Parl., Fl. Ital. 6: 482 (1885).

Syns. *Bartsia viscosa* L., Sp. Pl., ed. 1, 602 (1753).

*Eufragia viscosa* (L.) Benth. in A. DC., Prodr. 10: 543 (1846).

Glandular-pubescent, viscid, root-hemiparasitic annual, 10-40 cm; stems usually simple, terete; leaves 1-4 x 0.4-0.8 cm, oblong-lanceolate, crenate-dentate; flowers in a spike; calyx 1-1.2 cm, tubular, 4-lobed, accrescent to 1.6 cm in fruit; calyx-lobes slightly shorter than the tube; corolla 1.5-2.5 cm, the lower lip longer than the upper; capsule c. 1 x 0.35 cm, pubescent.

N; cultivated fields. Macaronesia, western and southern Europe, Mediterranean region, northern Iran.

### 17. *Lindernia* All.

Annuals or perennials, glabrous or pubescent; stems slender, erect, prostrate or creeping and rooting at the nodes; leaves opposite, simple, sessile or petiolate, entire, crenate or dentate, pinnately nerved or 3-5-nerved from the base of the lamina; flowers solitary, small, axillary or terminal, or in racemes or clusters, pedicellate or sessile; calyx shallowly 5-lobed, the tube 5-nerved; corolla tubular, bilabiate; anterior lip 3-lobed; posterior lip entire, emarginate or 2-lobed; stamens 2 or 4; stigma bilamellate; style slender, erect; capsule globose, ovoid, obovoid or cylindrical, bivalved; seeds numerous. About 120 species, tropical, subtropical and warm temperate regions.

1. *Lindernia parviflora* (Roxb.) Haines, Bot. Bihar & Orissa 635 (1922).  
Syn. *Gratiola parviflora* Roxb., Pi. Coromand. 3: 3, t. 204 (1811).

Glabrous annual 10-25 cm; stems erect, decumbent or ascending, branched; leaves 0.2-1.8 x 0.1-0.3 cm, ovate-lanceolate or elliptic, 1-3-nerved, entire, acute, opposite, sessile; flowers axillary or in terminal racemes; pedicel 0.7-1.2 cm, elongating to 2 cm in fruit; calyx 2-3 mm, glabrous, divided almost to the base; calyx-lobes lanceolate; corolla 4-6 mm, violet with white spots; fertile stamens 2; filaments 0.5-1 mm; staminodes 2; capsule 1.5-3 x 1.5-2 mm, obovoid-ellipsoid.

N (Kom Ombo), Nile banks. Egypt, Sudan, Ethiopia, tropical East and South Africa, Madagascar, India.

## OROBANCHACEAE

L. Boulos

Annuals or short-lived herbaceous perennials, parasites on roots of different dicotyledonous herbs or shrubs, devoid of chlorophyll; stems erect, usually swollen at the base; leaves scale-like, the lower often imbricate; flowers solitary or in terminal spikes or racemes, bracteate, bisexual, zygomorphic; calyx cylindrical or campanulate, 2-5-dentate, persistent; corolla cylindrical, bilabiate, rarely  $\pm$  5-lobed; stamens 4, didynamous, dorsifixed; ovary superior, 1-celled; ovules numerous, on parietal placentae; style 1; stigma 2-lobed or subentire; fruit a 2-valved capsule; seeds minute, numerous. 17 genera, about 230 species, Old World northern hemisphere, especially temperate and subtropical regions.

NOTE: The family Orobanchaceae is very closely related to hemi-parasitic Scrophulariaceae and both are often considered by some authors as one family. Davis, Fl. Turkey 7:1 (1982) comments: "The separation of this family (Orobanchaceae) from Scrophulariaceae, which itself contains parasitic genera, is supported only by weight of tradition".

1. Calyx-lobes dentate; corolla distinctly bilabiate  
+ Calyx-lobes rounded; corolla-lobes  $\pm$  equal

1. *Orobanche*  
2. *Cistanche*

## 1. *Orobanche* L.

Literature: Beck, G. 1890. Monogr. Gattung *Orobanche*. Bibl. Bot. 19: 1-275.  
 Gilli, A. in Davis, P. H. (ed.). 1982. Fl. Turkey 7: 3-23.  
 el-Hadidy, Azza M. H. in Boulos, L. 1995. Fl. Egypt Checklist 137-140.

Parasitic annuals or herbaceous perennials, often glandular-hairy; stems branched or simple, flowers in terminal spikes or racemes; bracteoles adnate to the calyx or absent; calyx campanulate and distinctly 4-5-dentate, or divided into 2 lateral 1- or 2-dentate halves, free or connate at the base; corolla cylindrical, distinctly bilabiate, the lower lip 3-lobed; stamens included; anthers hairy or glabrous; ovary cylindrical or ovoid. About 150 species, temperate and warm regions.

- |  |                           |
|--|---------------------------|
| 1. Each flower subtended by 1 bract and 2 bracteoles; calyx campanulate and distinctly 4-5-dentate   | 2                         |
| + Each flower subtended only by 1 bract; bracteoles absent; calyx divided into 2 lateral halves, each half entire or 2-dentate                 | 7                         |
| 2. Corolla 1-1.5(-1.7) cm  | 3                         |
| + Corolla 1.7-4 cm   | 4                         |
| 3. Calyx-teeth slightly shorter than the tube, acuminate; corolla-lobes of the lower lip rounded   | 1. <i>O. ramosa</i>       |
| + Calyx-teeth equalling the tube or longer, subulate; corolla-lobes of the lower lip acute   | 2. <i>O. nana</i>         |
| 4. Corolla 2.5-4 cm  | 6. <i>O. aegyptiaca</i>   |
| + Corolla not more than 2.2 cm   | 5                         |
| 5. Corolla-lobes of the lower lip acute  | 5. <i>O. schultzei</i>    |
| + Corolla-lobes of the lower lip rounded   | 6                         |
| 6. Inflorescence usually dense; corolla violaceous or bluish, the lobes rounded; anthers pilose to glabrous at the base                        | 3. <i>O. mutelii</i>      |
| + Inflorescence becoming elongate and rather lax; corolla azure blue at the apex, the lobes obtuse; anthers pubescent with crisped basal hairs | 4. <i>O. lavandulacea</i> |
| 7. Corolla constricted above the ovary; tube white, glossy, with blue limb   | 8. <i>O. cernua</i>       |
| + Corolla not constricted; tube dull white or yellowish, with white, pink or violet limb   | 8                         |
| 8. Corolla 2-3 cm  | 7. <i>O. crenata</i>      |
| + Corolla 1-2 cm   | 9. <i>O. minor</i>        |

### 1. *Orobanche ramosa* L., Sp. Pl., ed. 1, 633 (1753).

Syns. *Phelipaea ramosa* (L.) C. A. Mey., Verz. Pfl. Casp. Meer 104 (1831).

*Phelipanche ramosa* (L.) Pomel, Nouv. Mat. Fl. Atlant. 1: 103 (1874).

*Kopsia ramosa* (L.) Dumort., Comment. Bot. 16 (1822).

Annual or short-lived perennial, 10-40 cm; stems erect, usually much-branched, swollen at the base, glandular-hairy; inflorescence of loosely branched spikes; flowers 1-1.5(-1.7)

cm, subtended by 1 bract 5-8 mm, ovate-lanceolate, and 2 bracteoles 4-7 mm, linear-lanceolate; calyx 5-8 mm, 4-toothed; calyx-teeth 2-3 mm, triangular, acuminate; calyx-tube 3-5 mm; corolla 1.2-1.5(-1.8) cm, 2-lipped, glandular-hairy,  $\pm$  straight, slightly inflated at the base, narrowly funnel-shaped above, cream-yellowish, whitish, bluish or violet-blue; lobes of the lower corolla-lip rounded, denticulate to  $\pm$  entire; filaments glabrous or hairy at the base; capsule 5-6 mm.

Two varieties occur in Egypt:

var. **ramosa**

Stems to 40 cm; spikes lax; corolla bluish or violet-blue.

N, O, M, D, GE, S; cultivated ground, mainly on annual Solanaceous plants such as tomatoes, potatoes, eggplant, sweet pepper, petunia, etc.

var. **schweinfurthii** (Beck) Hadidy in Boulos, Fl. Egypt Checklist 138 (1995).

Syns. *Orobanche schweinfurthii* Beck, Biblioth. Bot. 4 (19): 73, t. 1, f. 12 (1890).

*Phelipanche schweinfurthii* (Beck) Soják, Cas. Nar. Mus. Odd. Prir. 140: 130 (1972).

Stems to 15 cm; spikes dense; corolla whitish to yellowish-cream.

N, M; cultivated ground, on clover (*Trifolium alexandrinum* L.)

Area of the species: Mediterranean region, Central Europe, western Asia.

NOTE: Several varieties have been described in this species. El-Hadidy in Boulos (1995) enumerates four varieties, of which var. *nana* (Reut.) Fiori and var. *brevispicata* (Ledeb.) R. A. Graham will be treated in this account as species: *Orobanche nana* and *Orobanche mutelii*, respectively. The two other varieties are var. *ramosa* and var. *schweinfurthii* (Beck) Hadidy, as treated above.

2. ***Orobanche nana*** (Reut.) Noë ex Beck, Biblioth. Bot. 4(19): 91, t. 1, f. 11 (1890).

Syns. *Phelipaea mutelii* (F. W. Schultz) Reut. var. *nana* Reut. in DC., Prodr. 11: 9 (1847).

*Phelipaea nana* (Reut.) Rehb. f. in Rehb. & Rehb. f., Icon. Fl. Germ. 20: 88, t. 151 (1862).

*Phelipaea ramosa* (L.) C. A. Mey. var. *nana* (Reut.) Boiss., Fl. Orient. 4: 499 (1879).

*Kopsia nana* (Reut.) Freyn ex Freyn & Brandis, Verh. Zool. Bot. Ges. Wien 38: 623 (1888).

*Orobanche ramosa* L. var. *nana* (Reut.) Fiori, Nouv. Fl. Anal. Ital. 2: 379 (1969).

Like *Orobanche ramosa*, but 8-25 cm; stems unbranched or branched; flowers 1-1.5 cm, few, usually not exceeding 10; calyx-teeth slightly shorter than the tube, acuminate; corolla blue or violet; lobes of the lower corolla-lip acute.

N, S; alluvial and sandy soils, on various plants. Mediterranean, region, Sinai, southwest Asia to Afghanistan.



3. **Orobanche mutelii** F. W. Schultz in Mutel, Fl. Fr. 2: 353, t. 43, f. 314 (1835), Suppl., t. 1, f. 5 (1835).

Syns. *Phelipaea ramosa* (L.) C. A. Mey. var. *brevispicata* Ledeb., Fl. Ross. 3: 313 (1849).

*Phelipaea mutelii* (F. W. Schultz) Reut. in A. DC., Prodr. 11:8 (1847).

*Phelipanche mutelii* (F. W. Schultz) Pomel, Nouv. Mat. Fl. Atlant. 1: 106 (1874).

*Phelipaea ramosa* (L.) C. A. Mey. var. *mutelii* (F. W. Schultz) Boiss., Fl. Orient. 4: 499 (1879).

*Kopsia ramosa* (L.) Dumort. var. *mutelii* (F. W. Schultz) Caruel in Parl., Fl. Ital. 6: 359 (1885).

*Kopsia mutelii* (F. W. Schultz) Bég. in Fiori & Paol., Fl. Anal. Ital. 2: 471 (1902).

*Phelipaea ramosa* (L.) C. A. Mey. subsp. *mutelii* (F. W. Schultz) Rouy, Bull. Soc. Bot. Fr. 55: 549 (1908).

*Orobanche ramosa* L. subsp. *mutelii* (F. W. Schultz) Cout., Fl. Port. 566 (1913).

*Orobanche ramosa* L. var. *brevispicata* (Ledeb.) R. A. Graham, Kew Bull. 1955: 467 (1955).

*Orobanche ramosa* L. var. *mutelii* (F. W. Schultz) Fiori, Nuovo Fl. Anal. Ital. 2: 379 (1969).

Glandular-hairy annual or short-lived perennial, 10-25 cm; stems slender, usually branched from the base; scales 6-9 x 2-3 mm, ovate-lanceolate; inflorescence branched, usually dense; flowers sessile or subsessile; bract equalling or shorter than the calyx, ovate-lanceolate; bracteoles shorter than the calyx, lanceolate-subulate; calyx c. 6 mm, 4-lobed, campanulate; calyx-lobes 2.5-3 mm, acuminate to subulate-filiform; corolla 1.5-2.2 cm, violaceous or bluish; tube narrowly-infundibular, constricted above the ovary; lobes rounded; anthers pilose to glabrous at the base.

N, M, De, R, S; cultivated and waste ground, on various plants. Mediterranean region, western and Central Asia.

4. **Orobanche lavandulacea** Rchb., Pl. Crit. 7: 48, f. 935 (1829).

Syns. *Phelipaea lavandulacea* (Rchb.) Reut. in A. DC., Prodr. 11: 7 (1847), pro parte.

*Phelipaea lavandulacea* (Rchb.) Pomel, Nouv. Mat. Fl. Atlant. 1: 106 (1874).

*Kopsia lavandulacea* (Rchb.) Caruel in Parl., Fl. Ital. 6: 357 (1885).

Glandular-hairy annual 15-60 cm; stems usually simple, sometimes branched above the base; scales 0.6-1.2 x 0.2-0.4 cm; inflorescence a dense spike, becoming elongate and rather lax; bract 0.8-1.1 cm, ovate-lanceolate, acute; bracteoles 4-6 mm, lanceolate; flowers sessile; calyx 6-8 mm, campanulate, 4-5-lobed; calyx-lobes 2.5-5 mm, unequal, narrowly triangular, acuminate; corolla 1.6-2.2 cm, azure blue at the apex; corolla-tube constricted above the calyx, the lobes obtuse; anthers pubescent, with basal hairs.

N; cultivated ground, on various plants. Canary Islands, Mediterranean region, eastwards to Iran.

5. **Orobanche schultzii** Mutel, Fl. Fr. 2: 352, t. 2, f. 4 (1835).

Syns. *Phelipaea schultzii* (Mutel) Walp., Repert. Bot. 3: 468 (1844-1845).

*Phelipaea pyramidalis* Reut. in A. DC., Prodr. 11: 7 (1847).

*Orobanche schultzii* Mutel forma *pyramidalis* (Reut.) Beck, Biblioth. Bot. 4 (19): 112 (1890).

*Kopsia schultzii* (Mutel) Bég. var. *typica* Bég. in Fiori & Paol., Fl. Anal. Ital. 2: 472 (1902).

*Phelipanche schultzii* (Mutel) Bég. in Fiori & Paol., Fl. Anal. Ital. 2: 472 (1902).

*Orobanche schultzii* Mutel var. *pyramidalis* (Reut.) Beck in Engl., Pflanzenr. (IV, 261): 92 (1930).

*Orobanche schultzii* Mutel var. *alexandrina* Beck in Engl., Pflanzenr. 96 (IV, 261): 92 (1930).

Glandular-hairy annual, 10-25 cm; stems usually unbranched; scales 0.7-1.3 x 0.3-0.5 cm, ovate-lanceolate, subacute to acute; inflorescence a dense spike; bract 7-9 x 3-4 mm, lanceolate, acute to acuminate,  $\pm$  equalling the calyx; bracteoles 6-8 x 1 mm, linear; flowers sessile or subsessile; calyx 0.8-1 cm, campanulate, 4-lobed; calyx-lobes 4-5 mm, lanceolate, prominently veined; corolla 1.5-2 cm, bluish with violet veins; corolla-tube constricted around the middle, slightly curved; lobes of the lower corolla-lip acute; anthers usually glabrous, sometimes hairy.

M; sandy soils, waste ground, on *Lycium* and species of Umbelliferae. Mediterranean region, northwest Iran, Afghanistan.

NOTE: Täckholm (1974) reported var. *alexandrina* as the only taxon known of this species from Egypt. However, according to el-Hadidy in Boulos (1995), three varieties are recorded from Egypt: var. *schultzii*, var. *alexandrina* and var. *pyramidalis*. These varieties are listed in this account as synonyms under *Orobanche schultzii*. A more detailed study on adequate material is needed to better understand these infraspecific taxa.

6. **Orobanche aegyptiaca** Pers., Syn. Pl., ed. 1, 2: 181 (1806).

Syns. *Lathraea phelipaea* Forssk., Fl. Aegypt.-Arab. 111 (1775), non L., Sp. Pl., ed. 1, 606 (1753).

*Orobanche ramosa* Vahl, Symb. Bot. 2: 71 (1791), non L., Sp. Pl., ed. 1, 633 (1753).

*Kopsia longiflora* (Pers.) Dumort., Dumort., Comment. Bot. 18 (1822).

*Phelipaea longiflora* (Pers.) C. A. Mey., Verz. Pfl. Casp. Meer. 104 (1831).

*Phelipaea pulchella* C. A. Mey. in Eichw., Pl. Nov. It. Casp.-Cauc. 17 (1831).

*Orobanche pedunculata* Viv., Pl. Aegypt. 4: 22 (1830).

*Orobanche indica* Buch.-Ham. in Roxb., Fl. Ind. 3: 27 (1832), non Spreng. (1825).

*Orobanche delilii* Decne., Ann. Sci. Nat., sér. 2, 4: 201 (1835).

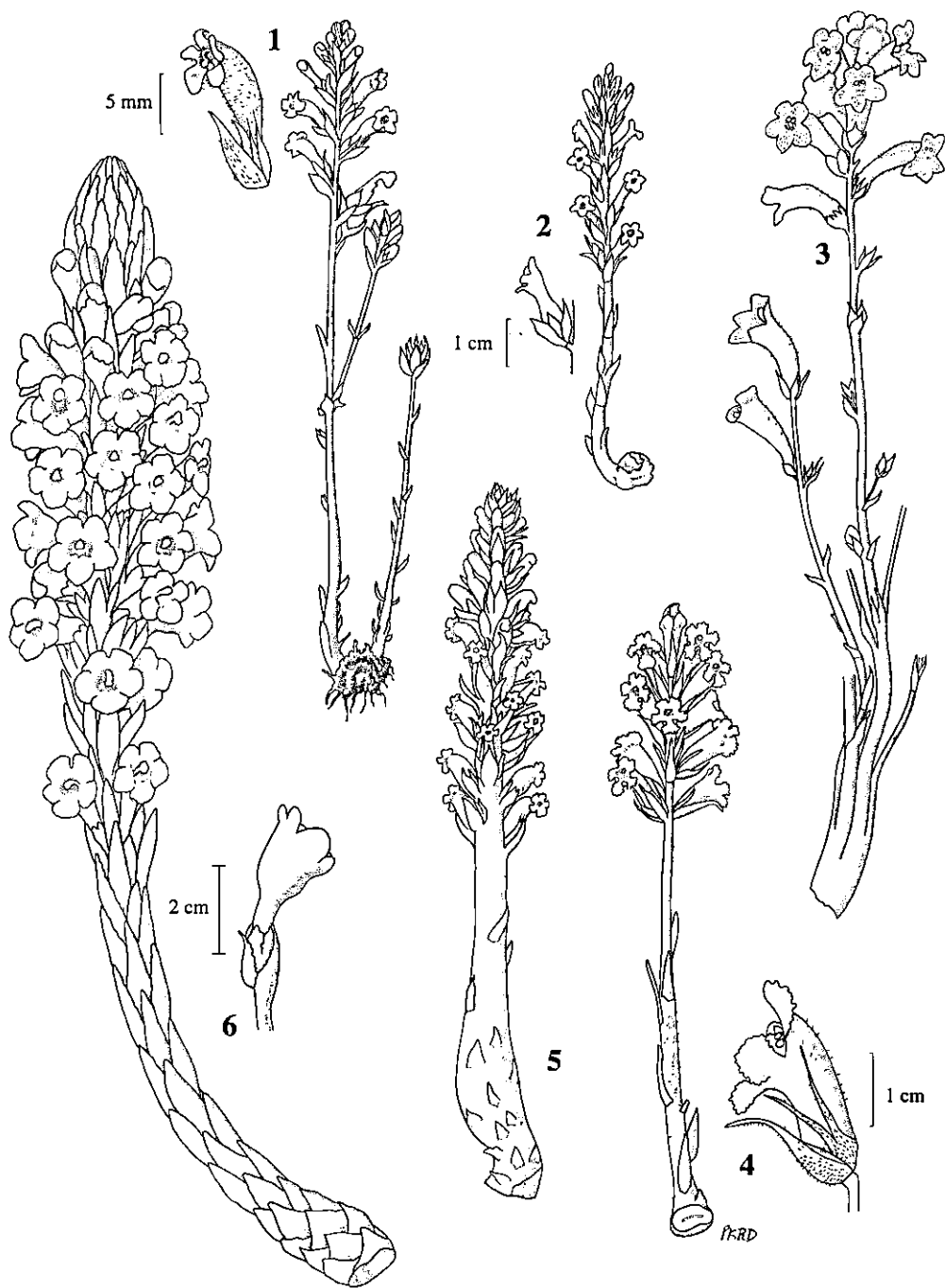
*Phelipaea indica* (Buch.-Ham.) G. Don, Gen. Syst. 4: 632 (1838).

*Phelipaea pedunculata* (Viv.) Walp., Repert. Bot. 3: 459 (1844-1845).

*Phelipaea delilii* (Decne.) Walp., Repert. Bot. 3: 459 (1844-1845).

*Phelipaea aegyptiaca* (Pers.) Walp., Repert. Bot. 3: 463 (1844-1845).

*Phelipaea aegyptiaca* (Pers.) Walp. var. *delilii* (Decne.) Reut. in A. DC., Prodr. 11: 10 (1847).



**Plate 22.** OROBANCHACEAE: habit of: *Orobanche ramosa* 1; flower (up left). *Orobanche schultzii* 2; flower left. *Orobanche aegyptiaca* 3. *Orobanche crenata* 4; flower (down right). *Orobanche cernua* 5. *Cistanche tubulosa* 6; flower (right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Patricia Davies.

- Phelipaea ramosa* (L.) C. A. Mey. var. *grandiflora* Ledeb., Fl. Ross. 3: 313 (1847).  
*Phelipanea aegyptiaca* (Pers.) Pomel, Nouv. Mat. Fl. Atlant. 1: 107 (1874).  
*Kopsia aegyptiaca* (Pers.) Caruel in Parl., Fl. Ital. 6: 358 (1885).  
*Orobanche aegyptiaca* Pers. var. *typica* forma *aemula* Beck, Biblioth. Bot. 4 (19): 102, t. 1, f. 14, 3 (1890).  
*Orobanche aegyptiaca* Pers. var. *aemula* (Beck) Beck in Engl., Pflanzenr. 96 (IV, 261): 83 (1930).

Glandular-hairy annual or short-lived perennial, 15-50 cm; stems much-branched; scales 0.4-1.2 x 0.2-0.4 cm, ovate to lanceolate; inflorescence of many-flowered, branched spikes; flowers sessile or pedicellate; bract 1-1.4 x 0.2-0.3 cm, lanceolate; calyx 1-1.3 cm, campanulate, 4-lobed; calyx-lobes 5-6.5 mm, subequal, linear-lanceolate to filiform; corolla 2.5-4 cm, violet-blue; corolla-tube constricted above the ovary, the upper part infundibular, slightly curved outwards; anthers with crisped white hairs; capsule 6-9 mm, ovoid, tapering at the apex, ridged.

N, M; fields, gardens, orchards; on *Petunia*, *Solanum*, *Vicia*, *Tropaeolum*, *Brassica*, *Raphanus*, and other genera. Egypt, southwest Asia to Crimea, Caucasus, Transcaspia, Himalayas.

NOTE: The type of *Orobanche aegyptiaca* was collected in Egypt by Coquebert (G-DC).

**7. *Orobanche crenata* Forssk., Fl. Aegypt.-Arab. 113 (1775).**

- Syns. *Orobanche speciosa* DC. in Lam. & DC., Fl. Fr., ed. 3, 6: 393 (1815).  
*Orobanche pruinosa* Lapeyr., Hist. Abrég. Plant. Pyr., Suppl. 87 (1818).  
*Orobanche angustisepala* F. W. Schultz, Flora (Regensburg) 26: 130 (1843).  
*Orobanche pelargonii* Caldesi, Nouv. Giorn. Bot. Ital. 12: 175 (1880).  
*Orobanche crenata* Forssk. var. *typica* forma *silvestris* Beck, Biblioth. Bot. 4 (19): 227 (1890).  
*Orobanche speciosa* DC. var. *pelargonii* (Caldesi) Arcang., Comp. Fl. Ital., ed. 2, 413 (1894).  
*Orobanche crenata* Forssk. var. *silvestris* (Beck) Beck in Engl., Pflanzenr. 96 (IV, 261): 139 (1930).

Glandular-hairy and pilose annual or short-lived perennial, 15-60 cm; stems simple, to 3 cm diam., succulent; scales 1.2-2.5 cm, lanceolate; inflorescence a many-flowered dense spike; bract 1.5-3 cm, narrowly lanceolate, long-acuminate, glandular-pilose, ± equalling the corolla-tube; flowers sessile; calyx 1.5-1.8 cm, of 2 separated halves; calyx-teeth 1-1.2 cm, narrowly lanceolate to linear; corolla 2-3 cm, campanulate, bilabiate, dull white or yellowish, with violet limb or veins; corolla-tube not constricted; stamens inserted 3-5 mm above the corolla-base; filaments densely pilose near the base; anthers glabrous.

N, M, De, S; alluvial and sandy soils, in fields, orchards and gardens; on different species, especially Leguminosae. Mediterranean region, Crimea, southwest Asia to Iran.

NOTE: The type of *Orobanche crenata* was collected in Cairo, Egypt, Forsskål 358 (C).

8. **Orobanche cernua** Loefl., Iter Hisp. 152 (1758).

Syns. *Orobanche curviflora* Viv., Pl. Aegypt. 4 (1): 22, 29 (1830).

*Orobanche nicotianaeae* Wight, Ill. Ind. Bot. 2: 179, t. 158 (1850).

*Orobanche cernua* Loefl. forma *desertorum* Beck, Biblioth. Bot. 4 (19): 142 (1890).

*Orobanche cernua* Loefl. var. *desertorum* (Beck) Stapf in Dyer, Fl. Trop. Afr. 4 (2): 466 (1906).

*Orobanche cernua* Loefl. var. *nepalensis* Reut. in A. DC., Prodr. 11: 33 (1847).

Puberulent perennial, with short glandular hairs, 10-30 cm; stems simple and thick, to 1.2 cm diam., or in groups and much thinner, always unbranched, although appearing branched from a thick base if in groups; scales 0.8-1.5 x 0.5-0.8 cm, broadly deltoid to ovate-lanceolate, acute to acuminate; inflorescence a dense spike; bract 1-1.2 cm, lanceolate; flowers sessile; calyx 6-9 mm, of 2 separated halves; calyx-teeth 3-6 mm, elliptic-lanceolate, 3-veined, acuminate to subulate; corolla 1.2-1.8 cm, tubular, constricted above the ovary; corolla-tube white, glossy, the limb short, blue; stamens inserted  $\pm$  at the middle of the corolla-tube; filaments almost glabrous; anthers glabrous or sparsely hairy.

N, M, D, R, S; sandy and alluvial soils, mainly on species of Compositae and Solanaceae, also on other plants. Mediterranean region, southwest Asia, eastwards to India, China and Australia.

9. **Orobanche minor** Sm. in Sowerby, Engl. Bot. 6, t. 422 (1797).

Glandular-pilose annual 10-50 cm; stems slender, unbranched; scales 0.6-1.6 x 0.2-0.4 cm, lanceolate to ovate-lanceolate, acute to acuminate; inflorescence a spike, becoming lax in the lower part; bract 1-2 cm, narrowly lanceolate, acuminate, usually glandular-hairy; flowers sessile; calyx 1.4-2 cm, the halves undivided or 2-dentate; calyx-teeth subulate-acuminate, glandular-pilose; corolla 1-2 cm, cylindrical, whitish, cream, violet or blue; corolla-limb with crisped white hairs, glabrous or with short glandular hairs; stamens inserted 2-4 mm above the corolla base; filaments long-pilose near the base or to above the middle; anthers shortly acuminate.

Three varieties occur in Egypt:

1. Upper corolla-limb with white crisped hairs outside var. **pubescens**  
+ Upper corolla-limb glabrous or with short glandular hairs 2

2. Corolla blue or violet var. **minor**  
+ Corolla whitish or cream var. **grisebachii**

var. **minor**

Syns. *Orobanche apiculata* Wallr., Sched. Crit. 130 (1822).

*Orobanche abyssinica* A. Rich., Tent. Fl. Abyss. 2: 137 (1851).

N, M, De; cultivated ground, mainly on species of Leguminosae.

var. **grisebachii** (Reut.) Hadidy in Boulos, Fl. Egypt Checklist 140 (1995).

Syns. *Orobanche grisebachii* Reut. in A. DC., Prodr. 11: 28 (1847).

*Orobanche palaestina* Reut. in A. DC., Prodr. 11: 718 (1847).

N (El Marg, Cairo). Cultivated ground, on species of Leguminosae, Compositae and other plants.

var. **pubescens** (d'Urv.) Meikle, Fl. Cyprus 2: 1242 (1985).

Syns. *Orobanche pubescens* d'Urv., Mém. Soc. Linn. Paris 1: 33 (1822).

*Orobanche versicolor* F. W. Schultz, Flora (Regensburg) 26: 129 (1843).

N (Cairo), M (Alexandria-Rosetta); cultivated ground, on species of Umbelliferae and Leguminosae.

Area of the species: Atlantic Islands, Mediterranean region, southwest Asia, Crimea, Transcaucasus, western Europe, extending to British Isles, East Africa; naturalized in North America and New Zealand.

## 2. **Cistanche** Hoffmanns. & Link.

Literature: el-Hadidy, Azza M. H. in Boulos, L. 1995. Fl. Egypt Checklist 141.

Herbaceous parasitic perennials; stems thick, succulent, unbranched, with numerous scales; flowers conspicuous, in dense spikes, each with 1 bract and 2 bracteoles; calyx campanulate, with 5 imbricate rounded lobes; corolla cylindrical-campanulate, enlarged towards the throat, slightly bilabiate; limb 5-lobed, spreading; lobes broad, subequal; stamens included; anthers coherent, woolly; ovary surrounded by a basal ring-shaped nectary; stigma thick, subentire. About 16 species, Mediterranean region, Ethiopia, western Asia to India, northwest China.

1. Corolla entirely bright yellow

+ Corolla at least partly violet or purple

2. **C. phelypaea**

2

2. Bracts and bracteoles glabrous or glabrescent; corolla 3.5-5 cm, yellow with purplish limb, or entirely white

+ Bracts and bracteoles densely woolly; corolla 2.5-3.5 cm, with a white tube and violet limb

1. **C. tubulosa**

3. **C. salsa**

1. **Cistanche tubulosa** (Schenk) Hook. f., Fl. Brit. Ind. 4 (2): 324 (1884).

Syns. *Phelipaea tubulosa* Schenk. Pl. Spec. Aegypt. Arab. 23 (1840).

*Cistanche lutea* Wight, Ill. Ind. Bot. 2: 180, t. 158b, f. 4 (1850), non (Desf.) Hoffmanns. & Link, Fl. Port. 318 (1813), nom. inval.

Glabrous perennial 40-80 cm; stem fleshy, often to 5 cm diam. at the base; scales 1.2-2.5(-3) x 0.5-1.5 cm, broadly ovate-lanceolate, imbricate; inflorescence a dense spike, often to 40 cm; flowers sessile; bract 1.5-2 cm, broadly lanceolate, acute, glabrous; bracteoles 1.2-1.6 cm, broadly ovate; calyx 1.6-2 cm; calyx-lobes ± equal, oblong, obtuse to rounded, with undulate, scarious margin; corolla 3.5-5 cm, yellow or rarely white, with purplish limb, infundibular, dilated around the middle, slightly curved; upper and lateral lobes rounded; anther-lobes obtuse at both ends, densely hairy; capsule 2-2.5 cm, ovoid, beaked; seeds 0.6 mm, pitted, beaked.

Two varieties occur in Egypt:

var. **tubulosa**

Corolla yellow with purplish limb.

M, De, GE, S; sandy and alluvial soils, on *Tamarix*, *Retama* and *Lycium*.

var. **albiflora** (Gilli) Hadidy in Boulos, Fl. Egypt Checklist 141 (1995).

Syn. *Cistanche tubulosa* (Schenk) Hook. f. forma *albiflora* Gilli in Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 87 (1974).

Corolla white.

S; sandy soils, host unknown.

Area of the species: North Africa, Sinai, western and Central Asia.

NOTE: The type of *Cistanche tubulosa* var. *tubulosa* was collected in Sinai, between Suez and el-Tor by Roth & Erdl.

2. **Cistanche phelypaea** (L.) Cout., Fl. Port. 571 (1913).

Syns. *Lathraea phelypaea* L., Sp. Pl., ed. 1, 606 (1753).

*Orobanche tinctoria* Forssk., Fl. Aegypt.-Arab. 112 (1775).

*Phelipaea lutea* Desf., Fl. Atlant. 2: 60, t. 146 (1798).

*Cistanche lutea* (Desf.) Hoffmanns. & Link, Fl. Port. 318, t. 63 (1813).

*Phelipaea tinctoria* (Forssk) Brot., Phyt. Lusit. 1: 36, t. 16 (1816).

*Orobanche phelypaea* (L.) Wallr., Orob. Gen. Diask. 70 (1825).

*Cistanche tinctoria* (Forssk.) Beck, Bull. Herb. Boiss., sér. 2, 4: 685, in nota (1904).

*Cistanche phelypaea* (L.) Cout. subsp. *lutea* (Desf.) Fernier in Fernier & Lainz, Annuár. Soc. Brot. 39: 130 (1973).

Glabrous perennial 20-80 cm; stems fleshy, robust; scales 1.8-2.5 x 0.3-0.8 cm, ovate-lanceolate, the margin scarious and denticulate; inflorescence a dense spike 10-20 cm; bract 1.5-2 x 0.3-0.4 cm, lanceolate; bracteoles 1-1.2 x 0.2 cm, narrowly lanceolate; flowers sessile; calyx 1.4-1.6 cm, the lobes 3-4 mm, broadly ovate; corolla 3-5 cm, uniform bright yellow; corolla-tube slightly curved, the lobes broadly rounded; filaments sparsely hairy at the base; anthers pubescent; capsule 1.2 x 0.4 cm, narrowly ovoid; seeds 0.4 mm.

N, M, O, D, R, S; desert sandy and alluvial soils, edges of cultivation, on woody species of Chenopodiaceae and Zygophyllaceae. Southern Portugal, southern Spain, Crete, North Africa, Sinai, Arabia.

3. **Cistanche salsa** (C. A. Mey.) Beck in Engl. & Prantl., Natürl. Pflanzenfam. (IV, 3b): 129 (1893).

Syns. *Phelipaea salsa* C. A. Mey. in Ledeb., Fl. Altaica 2: 461 (1830).

*Phelipaea ambigua* Bunge, Mém. Sav. Etr. Pétersb. 7: 429 (1851).

*Orobanche salsa* (C. A. Mey.) Kuntze, Acta Horti Petrop. 10: 225 (1887).

*Cistanche ambigua* (Bunge) Beck in Engl., Pflanzenr. 96, (IV, 261): 40 (1930).

Woolly-tomentose perennial 10-30 cm; stems fleshy, to 3.5 cm diam. at the base; scales 1-3.5 x 0.2-0.4 cm, narrowly lanceolate, imbricate; inflorescence a spike 6-12 cm; bract 1.6-1.8 cm, lanceolate, densely woolly; bracteoles 1.4-1.6 cm, lanceolate, densely woolly, especially at the margin; calyx c. 1.5 cm, 5-lobed, campanulate, glabrescent; lobes 6-7 mm, suborbicular; corolla 2.5-3.5 cm, narrowly campanulate, slightly curved; tube white, glabrous; the limb violet; corolla-lobes  $\pm$  equal, suborbicular, denticulate; filaments villous near the base; anthers densely woolly, acuminate, mucronate.

S; sandy desert wadis, mainly on woody species of Chenopodiaceae. Sinai, Palestine, Turkey, southern Russia, Transcaucasus, Iran, Central Asia, Mongolia, Tibet.

*Imperfectly known species:*

**Cistanche violacea** (Desf.) Beck in Engl. & Prantl, *Natürl. Pflanzenfam.* (IV. 3b): 129 (1893).

Syns. *Phelipaea violacea* Desf., *Fl. Atlant.* 2: 60, t. 145 (1798).

*Orobancha phelypaea* Willd., *Sp. Pl.*, ed. 4, 3: 352 (1800).

*Orobancha violacea* (Desf.) Wallr., *Orob. Gen. Diask.* 70 (1825).

NOTE: According to el-Hadidy in Boules (1995), *Cistanche violacea* (Desf.) Beck is known in Egypt only from Burg el-Arab, western Mediterranean district. I have not seen any authentic material of this species collected from Egypt. Meanwhile, Täckholm (1974) and Greuter *et al.* (1989) consider its occurrence in Egypt uncertain.

## GLOBULARIACEAE

### L. Boulos

Perennials or shrubs; leaves alternate or in a basal rosette, exstipulate; flowers zygomorphic, bisexual, bracteate, in heads or spikes; calyx 5-dentate, persistent, sometimes bilabiate; corolla bilabiate, sometimes unilabiate; stamens 4, didynamous, inserted in the corolla-tube; pistil 1, 2-carpellate; ovary superior, 1-locular, with 1 ovule; style 1, filiform; stigma capitate or 2-lobed; fruit a nut, enclosed in the calyx; seed 1, endosperm present. 9 genera, about 230 species, Macaronesia, Mediterranean region, Sinai, Arabia, East Africa.

### 1. *Globularia* L.

Literature: Fayed, A. A. in el-Hadidi, M. N. (ed.). 1980. *Flora of Egypt*, 162. Globulariaceae. *Taeckholmia* addit. ser.

Perennial herbs or low shrubs; flowers bisexual, zygomorphic, hypogynous, bracteate, numerous in dense heads; bracts of the involucre imbricate; calyx 5, persistent; corolla 5, zygomorphic, bilabiate; inner lip shorter, bidentate or 2-lobed; upper lip longer, 3-lobed; stamens 4, didynamous, epipetalous; pistil unilocular; ovule 1, pendulous; style 1; stigma capitate or 2-lobed; fruit a nut, enclosed within the persistent calyx. 22 species, mainly Mediterranean region.

1. Leaves entire; involucre hairy all over

+ Leaves shallowly 3-lobed; involucre hairy only along the margin

1. *G. arabica*

2. *G. alypum*



1. **Globularia arabica** Jaub. & Spach., Ill. Pl. Orient. 3: 76, t. 260 (1848).

Syns. *Globularia eriocephala* Pomel, Nouv. Mat. Fl. Atlant. 111 (1874).

*Globularia alypum* L. var. *arabica* (Jaub. & Spach) Cavara & Grande,  
Bull. Soc. Bot. Ital. 1925: 105 (1925).

Low shrub 20-40 cm; juvenile branches and leaves covered with minute calcareous dots; leaves 0.5-2 x 0.3-0.8 cm, obovate to spatulate, alternate, or clustered at the nodes on old branches, entire, mucronate, glabrous; flowers in terminal heads; bracts of the involucre 4-5.5 x 1-1.5 mm, acuminate, covered all over with spreading hairs; calyx 4.5-5.5 mm, covered with 1 mm spreading hairs; calyx-tube 1-1.5 mm; lobes c. 4 mm, linear-lanceolate; corolla 7-8 mm, blue; tube 3.5-4 mm; inner lip 2-lobed; outer lip 3-lobed, much longer than the inner; stamens 4,  $\pm$  equal; nutlet enclosed within the persistent calyx.

M, De, S; calcareous ridges. Algeria, Tunisia, Libya, Egypt, Palestine, Lebanon, Arabia, Sudan, Ethiopia, Somalia.

NOTE: The type of *Globularia arabica* was collected near Alexandria, Egypt, Aucher-Eloy 2538 (P).

2. **Globularia alypum** L., Sp. Pl., ed. 1, 53 (1753).

Like *Globularia arabica* but shrub 40-80 cm; at least some of the leaves shallowly 3-lobed; bracts of the involucre hairy only along the margin.

? M; calcareous ridges. Spain, Portugal, North Africa, East Mediterranean region.

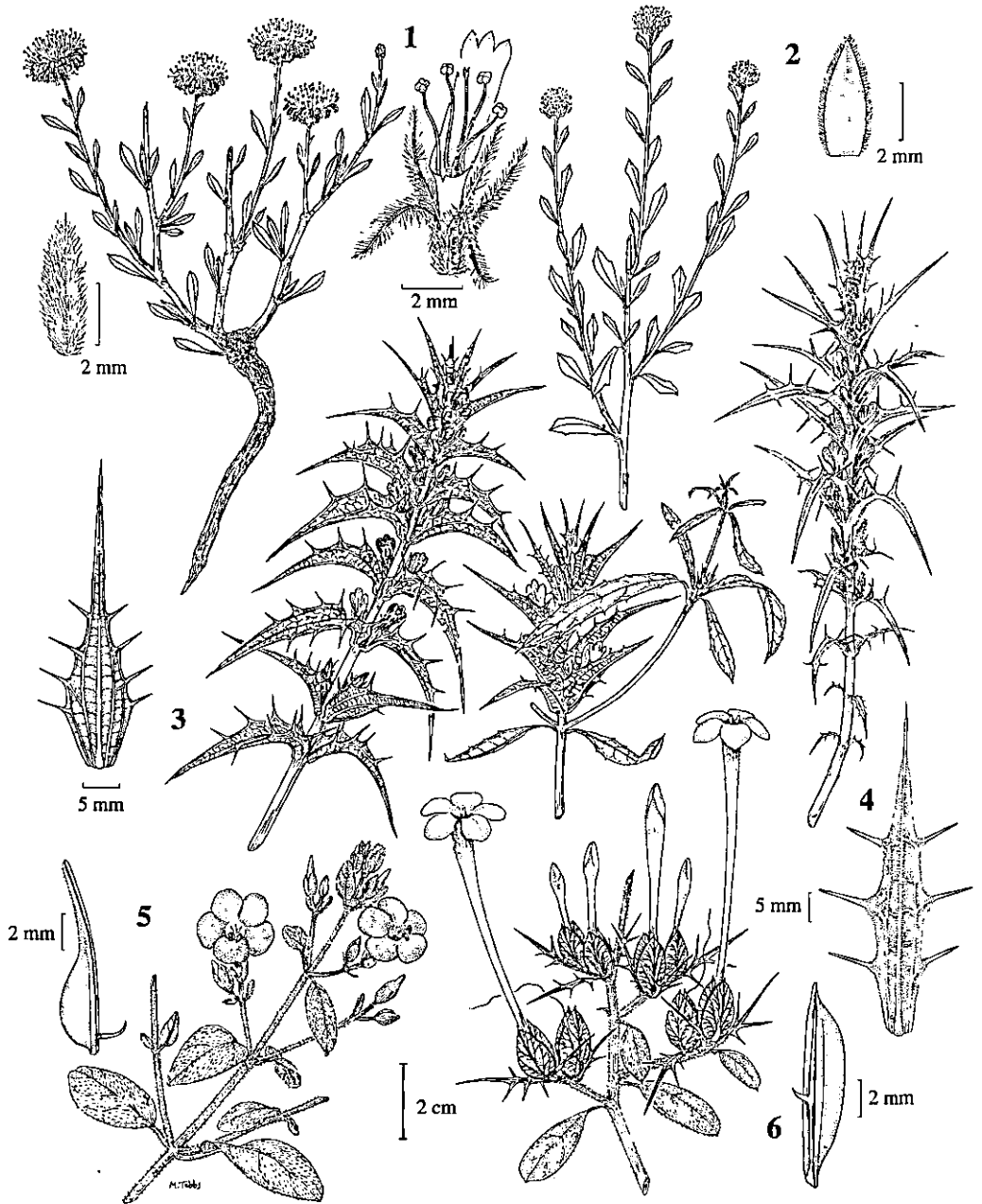
NOTE: The occurrence of this species in Egypt needs to be confirmed by acquiring new collections.

## ACANTHACEAE

### L. Boulos

Woody perennials or low shrubs, less commonly annuals or (rarely, not in Egypt) trees or climbers, sometimes spiny; leaves opposite, decussate, often divided, exstipulate; inflorescence cymose or racemose or flowers sometimes solitary; bracts and bracteoles present; flowers bisexual, regular or zygomorphic, (4-)5-merous, with a nectariferous disc below the ovary; calyx deeply (4-)5-lobed, sometimes bilabiate; the upper lip sometimes not developed; corolla 2-lipped or 5-lobed; stamens 4 or 2, very rarely 5, epipetalous; pistil 1; carpels 2; ovary superior; locules 2, each with 2 or more ovules; style 1; stigmas 2, often unequal; fruit usually a 2-locular, loculicidal capsule, often dehiscent from the apex to the base; dispersal of seeds assisted by hook-like outgrowths of the funicle; seed flattened, without or with scanty endosperm; embryo large. 229 genera, about 3450 species, tropical and subtropical regions, few temperate.

- |                   |   |
|-------------------|---|
| 1. Plant spiny    | 2 |
| + Plant not spiny | 3 |



**Plate 23. GLOBULARIACEAE:** *Globularia arabica* 1, habit; flower (up right); bract (left). *Globularia alypum* 2, flowering branch; bract (up right). **ACANTHACEAE:** *Blepharis edulis* 3, flowering branch with open spike; habit with leaves (right); bract (left). *Blepharis attenuata* 4, flowering branch; bract (down right). *Barleria hochstetteri* 5, flowering branch; half capsule (left). *Barleria acanthoides* 6, flowering branch; half capsule (right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

2. Corolla 1-labiate, blue	1. <b>Blepharis</b>
+ Corolla 5-lobed, white	2. <b>Barleria</b>
3. Low shrub	4
+ Annual	6
4. Flowers pedicellate	2. <b>Barleria</b>
+ Flowers sessile	5
5. Flowers in the leaf axils	3. <b>Ruellia</b>
+ Flowers in terminal spikes	4. <b>Ecboium</b>
6. Flowers sessile	5. <b>Justicia</b>
+ Flowers pedicellate	6. <b>Peristrophe</b>

### 1. **Blepharis** Juss.

Literature: Vollesen, K. 2000. *Blepharis* (Acanthaceae). 1-342. Roy. Bot. Gardens, Kew.

Perennials or annuals, sometimes woody at the base; leaves in whorls of 4 by shortening of internodes; flowers in spikes; bracts spiny, conspicuously veined; bracteoles linear-lanceolate, shorter than the bracts; calyx 4-lobed; lobes unequal, the inner shorter than the outer, persistent; corolla 1-labiate, usually blue; tube short, indurate, constricted above; limb 3- or 5-lobed; stamens 4, inserted at the base of the corolla-tube; filaments thick, the 2 posterior ending in an appendage; anthers with 1 theca, hairy; capsule 2 (-4)-seeded; seeds covered with coiled hairs which unroll and become mucilaginous when moistened. 127 species, mainly Old World tropics.

1. Bracts in the middle of the spike ovate, with sparse to dense long pilose hairs; uppermost lateral spines shorter than or equalling the width of the bract 1. **B. edulis**  
 + Bracts in the middle of the spike linear-lanceolate, without long pilose hairs; uppermost lateral spines much longer than the width of the bract 2. **B. attenuata**

1. **Blepharis edulis** (Forssk.) Pers., Syn. Pl. 2: 180 (1806).

Syns. *Acanthus edulis* Forssk., Fl. Aegypt.-Arab. 114 (1775).

*Acanthodium spicatum* Delile, Descr. Egypte, Hist. Nat. 97, t. 33, f. 2 (1814).

*Blepharis ciliaris* auct. mult.

Grey-pubescent annual or perennial, 15-35 cm; stems rigid, much-branched from the base; cauline leaves 2-6 x 0.5-1.5 cm, oblong-lanceolate, spinulose at the margins, tapering to a petiole; flowers in dense spikes 10-20 cm; bracts 3-5 x 1-1.5 cm, ovate, long-acuminate, spreading, with sparse to dense long pilose hairs, the uppermost 3-5 pairs of lateral spines shorter than or equalling the width of the bract; bracteoles 1-1.5 cm; calyx 1-1.2 x 0.3-0.4 cm, scarious, the posterior lobe 2-3-denticulate; corolla 1.8-2.6 cm, blue, hairy outside; capsule 6-9 mm; seeds 4-5.5 x 2.5-4 mm, densely hairy.

D, R, GE, S; desert wadis and plains. Egypt, Sudan, tropical East Africa, Arabia, Iran.

NOTE: *Blepharis edulis* has long been confused with *B. ciliaris* and was formerly treated as synonymous. The latter species is known from Oman, Iran and Pakistan.

2. **Blepharis attenuata** Napper, Israel J. Bot. 21: 164 (1972).

Like *Blepharis edulis*, but with fine pale greyish indumentum; spikes to 30 cm, rather lax; bracts 5-7 cm, linear-lanceolate, without long pilose hairs; uppermost lateral spines 1-1.2 cm, much longer than the width of the bract.

De, S; desert plains and wadis. Egypt, Palestine.

**Imperfectly known species:**

**Blepharis linariifolia** Pers., Syn. Pl. 2: 180 (1806).

Syns. *Acanthodium hirtum* Nees in DC., Prodr. 11: 274 (1847).

*Blepharis hirta* (Nees) Martelli, Fl. Bogos 65 (1886).

This annual species (for full synonymy and description see Vollesen (2000), pp. 97-102) occupies the belt of the Sahel in Africa from Mauritania and Senegal to Sudan and western Ethiopia. However, a collection labelled "Egypt, Cairo, Ghizé (Giza)", made by Paul von Würtemberg *s.n.* (W), seems to be the only record of this species outside the Sahel belt, far outside the rest of the distribution area. Most probably this collection is based on mixed labels as the occurrence of this species in Egypt is most unlikely, a point of view also shared by Vollesen (personal communication).

**2. Barleria L.**

Perennials or low shrubs, sometimes spiny; leaves entire; flowers solitary, axillary, in dense 1-sided racemes or in few-flowered cymes; bracts leaf-like or modified to simple or pinnate spines; calyx of 4 unequal lobes, 2 large and 2 small and linear; corolla 5-lobed, the tube cylindrical or cylindrical below and funnel-shaped above; stamens 2; anthers with 2 thecae; staminodes 2-3; capsule 2-4-seeded; seeds pilose. 250 species, dry tropical regions, but especially Africa.

1. Plant unarmed; flowers pedicellate

1. **B. hochstetteri**

+ Plant spiny; flowers subsessile

2. **B. acanthoides**

1. **Barleria hochstetteri** Nees in A. DC., Prodr. 11: 231 (1847).

Pubescent unarmed low shrub, 20-50 cm; leaves 2-6 x 1-2.5(-3.5) cm, oblong-elliptic, obtuse, sparsely strigose; petiole 3-8 mm; flowers in axillary lax pedunculate 1-3-flowered cymes; bracts 0.5-1 x 0.2-0.3 mm, leaf-like, remote from the flowers; calyx-lobes 0.8-1 x 0.5 cm, broadly elliptic, the base cuneate, the apex rounded, mucronate; corolla 2-2.5 cm, funnel-shaped, pale blue, the tube c. 1 cm; lobes ± equal, spreading; capsule c. 1.2 cm including a sterile beak c. 6 mm, 2-seeded; seeds c. 4 mm, discoid, densely covered by long hygroscopic hairs.

GE; stony wadis and hillsides. Southeast Egypt, Sudan, tropical East Africa, Eritrea, Ethiopia, Djibouti, Somalia, Arabia.

2. **Barleria acanthoides** Vahl, Symb. Bot. 1: 47 (1790).

Spiny pubescent low shrub, 50-80 cm; spines with short lateral spines; leaves 2-5 x 1-2 cm, oblong-elliptic or oblanceolate, mucronate; petiole 3-8 mm; flowers in dense 1-sided short racemes; bracts 1-2 cm, spiny, with lateral spines 3-8 mm; calyx-segments c. 1.5 x

1 cm, papery, ovate, mucronate, prominently nerved; corolla 8-9 cm, white; corolla-tube slender; lobes 5, equal; capsule 1.2-1.4 x 0.5 cm, oblong-ellipsoid, acute, black, glossy, 4-seeded; seeds c. 4 mm, discoid, densely covered by long hygroscopic hairs.

De, GE; stony wadis and hillsides. Southeast Egypt, Sudan, tropical East Africa, Eritrea, Ethiopia, Djibouti, Somalia, Arabia.

### 3. *Ruellia* L.

Perennials or low shrubs; leaves entire; flowers 1-3 in subsessile axillary cymes or clusters; bracts leaf-like; bracteoles present, exceeding the deeply 5-lobed calyx; corolla with or without a long cylindrical tube, campanulate above; corolla-lobes 5, equal; stamens 4; anthers with 2 thecae; capsule many-seeded; seeds discoid, appressed-hairy along the margin. About 150 species, tropical and temperate regions, most diverse in tropical America.

#### 1. *Ruellia patula* Jacq., Misc. Austr. Bot. 2: 358 (1781).

Perennial, woody at the base, 30-50 cm; stems erect or prostrate, much-branched from the base; leaves 1-3.5 x 0.8-1.5 cm, ovate or elliptic, pubescent, with white or sometimes glandular hairs; petiole 3-8 mm; flowers 1-3 in axillary cymes; calyx 5-7 mm, the tube 1.5-2 mm; calyx-lobes 4.5-5 x 1 mm, linear, acute; corolla blue, the tube 3 cm, the limb 3 cm broad; capsule 1.5-1.8 x 0.6-0.8 cm, clavate, mucronate, glabrous, lustrous; seeds c. 3 mm, flattened, rounded, thick along the margin.

GE; stony ground, rocky hillsides. Southeast Egypt, Sudan, Eritrea, Ethiopia, Djibouti, Somalia, Kenya, Uganda, Rwanda, Burundi, Zaïre, Tanzania, Zambia, Zimbabwe, Botswana, Angola, South Africa, Zaïre, Niger, Socotra, Arabia, India.

### 4. *Ecbolium* Kurz

Literature: Vollesen, K. 1989. A revision of *Megalochlamys* and *Ecbolium* (Acanthaceae: Justiceae). Kew Bull. 44: 601-693.

Low shrubs; leaves entire; flowers in terminal and axillary spikes, usually densely bracteate; calyx of 5 free lobes; lobes subequal, linear-lanceolate; corolla bilabiate; the upper lip notched, the lower 3-lobed; stamens 2; anthers with 2 thecae; capsule 2-seeded; seeds discoid, smooth or rough. 22 species, tropical Africa and Asia.

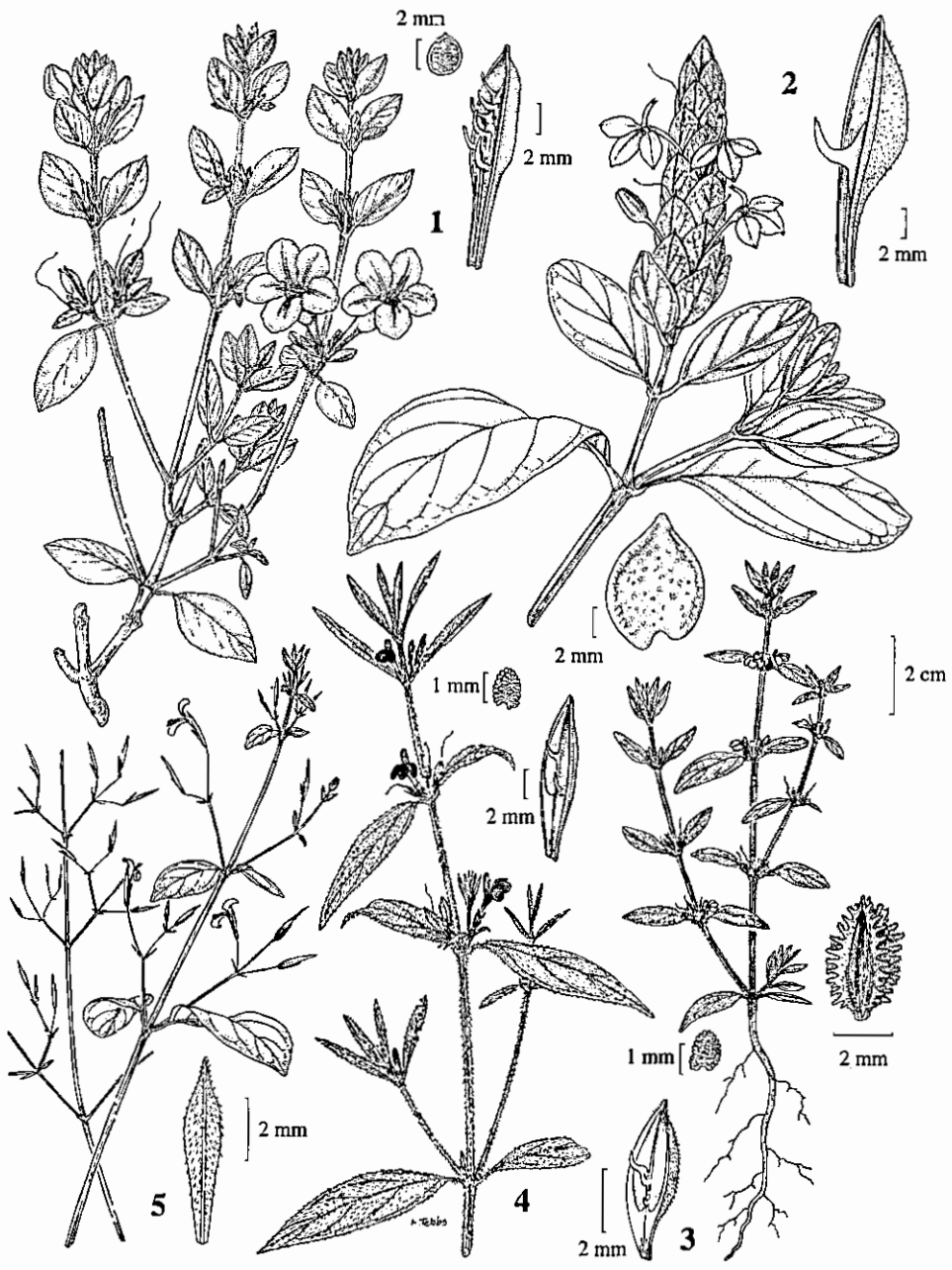
#### 1. *Ecbolium viride* (Forssk.) Alston in Trimen, Handb. Fl. Ceylon 6: 229 (1931).

Syns. *Justicia viridis* Forssk., Fl. Aegypt.-Arab. 5 (1775).

*Ecbolium linnaeanum* sensu auct., non Kurz (1871).

Glabrescent low shrub 1-2 m; stems much-branched; leaves 3-12 x 1.5-5 cm, ovate-lanceolate to elliptic, obtuse; petiole 2-5 mm; flowers in terminal spikes to 15 cm; bracts numerous, 1.5-2 x 1.2-1.5 cm, imbricate, broadly ovate, mucronate; corolla green, the tube 3 cm, the limb 2.5 cm broad; corolla-lobes broadly ovate, acute; capsule 1.8-2 cm, clavate, shortly pubescent; seeds c. 8 x 7 mm, cordate, cream-yellow, tuberculate, margins thick.

GE; rocky ground. Southeast Egypt, Sudan, tropical East Africa, Djibouti, Somalia, Arabia; possibly introduced into India.



**Plate 24. ACANTHACEAE:** *Ruellia patula* 1, flowering and fruiting branch; half capsule and seed (up right). *Ecbolium viride* 2, flowering branch; half capsule (up right); seed (down right). *Justicia heterocarpa* subsp. *heterocarpa* 3, habit; indehiscent fimbriate-margined capsule (right); half capsule and seed (down left). *Justicia ladanoides* 4, flowering and fruiting branch; half capsule and seed (up right). *Peristrophe paniculata* 5, flowering and fruiting branches; whole capsule (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

## 5. *Justicia* L.

Literature: Hedrén, M. 1989. *Justicia* Sect. *Harnieria* (Acanthaceae) in tropical Africa. *Symb. Bot. Upsal.* 29(1): 1-141.

Annuals, perennials or low shrubs; leaves entire; flowers in axillary or terminal spikes, or in axillary clusters; bracts present; calyx-lobes 5, linear-lanceolate; corolla bilabiate, the upper lip 2-lobed, the lower 3-lobed; stamens 2; anthers with 2 thecae, one above the other, the lower tailed; capsule 4-seeded, sometimes 1-seeded indehiscent fruit also present; seeds muriculate. About 600 species, tropical and warm regions, but especially tropical America.

1. Flowers *c.* 6 mm; capsules 1- or 4-seeded  
+ Flowers *c.* 8 mm; all capsules 4-seeded

1. ***J. heterocarpa***  
2. ***J. ladanoides***

1. ***Justicia heterocarpa*** T. Anderson, *J. Linn. Soc. London, Bot.* 7: 41 (1864)  
subsp. ***heterocarpa***

Pubescent annual 10-40 cm; stems erect, angular, ascending or prostrate, branched; leaves 1.5-3.5 x 0.5-1 cm, ovate or elliptic, obtuse or subacute; petiole 2-4 mm; flowers in axillary clusters; bracts *c.* 3 x 2 mm, elliptic, acute, hairy; corolla 3-4 mm, purplish-red; capsule 3-4 x 1.5 mm, ellipsoid, most (normal) capsules glabrous, 4-seeded, dehiscent; abnormal capsules fimbriate-margined, 1-seeded, indehiscent; seeds 1.5 x 1 mm, trigonous, tuberculate, brownish.

GE; moist alluvial soils. Southeast Egypt, Sudan, Eritrea, Ethiopia, Somalia, Kenya, Uganda, Tanzania, Socotra, Arabia.

2. ***Justicia ladanoides*** Lam., *Tabl. Encycl.* 1(1): 42 (1791).

Syns. *Tyloglossa kotschyi* Hochst., *Flora* 26: 74 (1843).

*Justicia kotschyi* (Hochst.) Dandy in F. W. Andrews, *Fl. Pl. Sudan* 3: 180 (1956).

*Justicia schimperi* (Hochst.) Dandy in F. W. Andrews, *Fl. Pl. Sudan* 3: 180 (1956) var. *kotschyi* (Hochst.) J. K. Morton, *Kew Bull.* 32: 437 (1978).

Like *Justicia heterocarpa*, but scabrid-hairy; capsule *c.* 7 x 2.5 mm, ellipsoid, acute, all capsules 4-seeded; seeds *c.* 2 mm diam., triangular-discoid, flattened, densely verrucose.

GE; Senegal to Ethiopia, extending north to Sudan and southeast Egypt, southwards to northern Zaire, Uganda and Kenya.

## 6. *Peristrophe* Nees

Annuals, perennials or low shrubs; leaves entire; flowers in lax paniculate inflorescences formed of pedunculate axillary cymes; bracts 2, unequal, the larger linear-oblongate, twice the size of the smaller; each pair of bracts with 2 flowers; each flower with 2 linear bracteoles, similar to the calyx-lobes. 15 species, tropical regions of the Old World.

1. ***Peristrophe paniculata*** (Forssk.) Brummitt, *Kew Bull.* 38: 451 (1983).

Syns. *Dianthera paniculata* Forssk., *Fl. Aegypt.-Arab.* 7 (1775).

*Peristrophe bicalyculata* (Retz.) Nees in Wall., *Pl. As. Rar.* 3: 113 (1832).

Hispid annual 30-80 cm; stems 6-angled, much-branched, swollen at the nodes; leaves 2-7 x 1-2.5 cm, broadly lanceolate, acute; petiole 3-6 mm; flowers in axillary cymes, forming a large lax panicle; longest bract *c.* 1 cm, linear, acuminate, scabrid; calyx-lobes 3-4 x 1 mm, scarious-margined, acuminate; corolla *c.* 1 cm, mauve, strongly 2-lipped; capsule *c.* 1.2 cm, obovoid, with a long solid stalk-like based part, of which the stalk *c.* 6 mm, sparsely puberulous all over; seeds *c.* 2 mm, discoid, covered with tiny barbed glochidia (adhesive if touched).

De, GE; sandy and silty moist soils. Southeast Egypt, Sudan, tropical East Africa, Arabia, Niger, northern Nigeria, Mali, Mauritania, Cape Verde Islands.

## PEDALIACEAE

### L. Boulos

Annuals or perennials; leaves, simple, entire or lobed, opposite or alternate, petiolate; flowers bisexual, solitary in the leaf axils or in terminal racemes; calyx deeply 5-lobed; corolla zygomorphic, 5-lobed, often bilabiate; disc glandular, fleshy, hypogynous; stamens 4 or 2, didynamous with 1 or 3 staminodes, inserted near the base of the corolla-tube; ovary superior, 2-4(-8)-locular; style 1, terminal; fruit a capsule, dehiscent or indehiscent; seeds attached to the margins of valves or to a central column. 17 genera, 85 species, tropical and warm regions, but especially coasts and arid regions.

- |   |                    |
|---|--------------------|
| 1. Corolla white or pink; capsule unarmed                     | 1. <b>Sesamum</b>  |
| + Corolla yellow or purple-brown; capsule with 4 basal spines | 2                  |
| 2. Corolla yellow; fruit 4-angled                             | 2. <b>Pedalium</b> |
| + Corolla dull purple; fruit not angled                       | 3. <b>Rogeria</b>  |

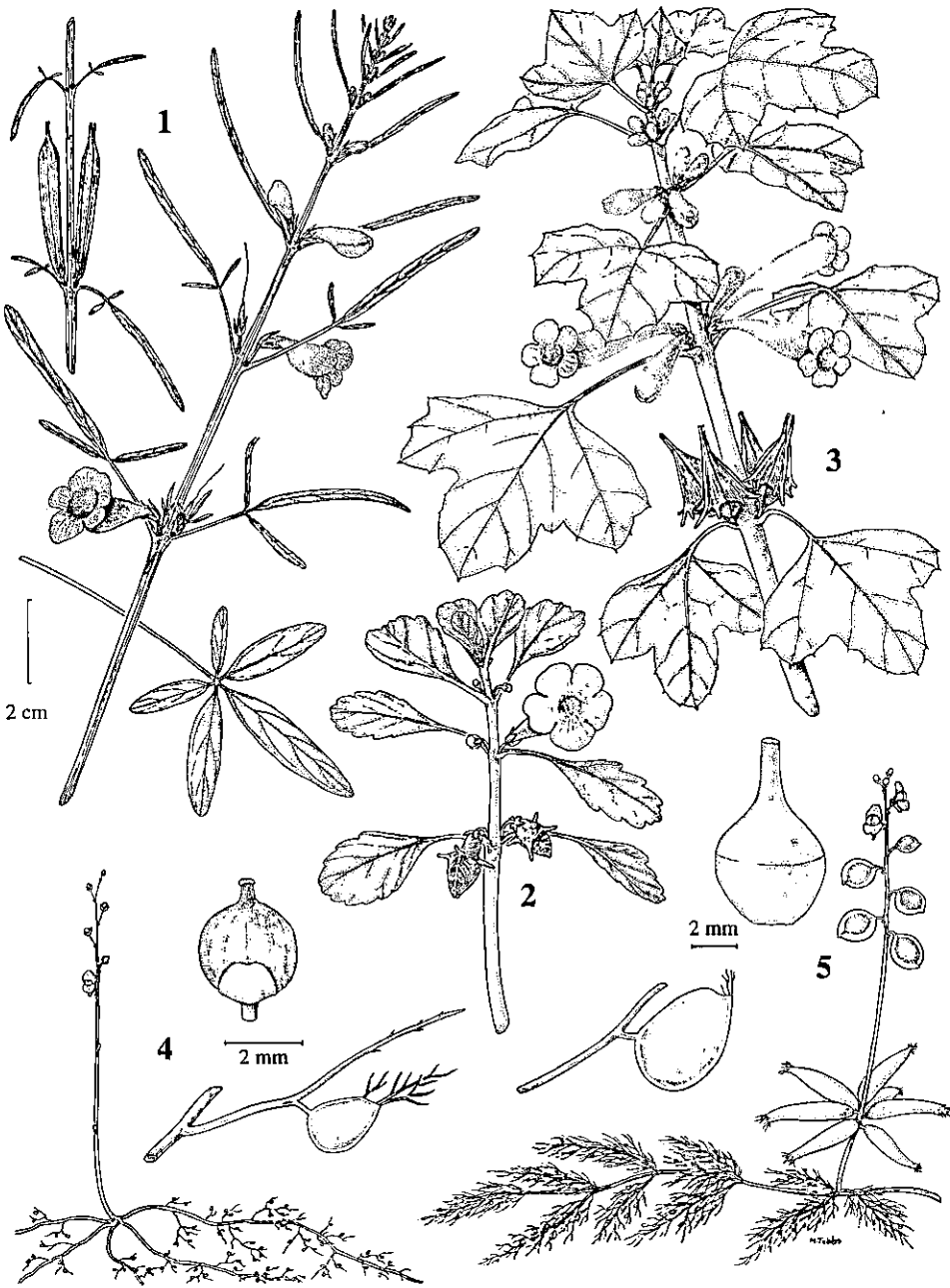
#### 1. **Sesamum** L.

Annuals; leaves entire or dentate, the lower opposite, the upper alternate; calyx slightly zygomorphic, persistent; corolla-tube widening upwards; limb bilabiate, the 2 upper lobes shorter than the 3 lower; stamens 4, didynamous; capsule oblong, short-beaked, obtusely 4-angular, with 4 longitudinal grooves, 2-celled, each cell divided by a parietal septum, becoming 4-locular; seeds numerous, attached to a central column. 15 species, Old World tropics and South Africa.

1. **Sesamum alatum** Thonn. in Schumacher & Thonn., Beskr. Guin. Pl. 284 (1829).  
 Syns. *Volkameria alata* (Thonn.) Kuntze, Rev. Gen. Pl. 3: 247 (1893).  
*Sesamum sabulosum* A. Chev., Etud. Fl. Afr. Centr. Franç. 1: 229 (1913).

Annual 30-80 cm; stems simple or branched; leaves opposite, palmately 3-5-foliolate or -partite; lobes 1.5-8 x 0.2-1 cm, linear-lanceolate; central lobe longest, subacute, cuneate at the base; petiole 2-6 cm, glabrous except for the mucilage glands which are conspicuous below; upper leaves simple; flowers 2.5-3 cm; calyx-lobes 3-3.5 mm, linear-lanceolate, glandular-hairy, deciduous; corolla white or pink, sparsely glandular and pilose outside; capsule 2.5-3.5 x 0.5-0.7 cm, excluding the acuminate beak 0.5-1.2 cm, 4-sulcate; seeds 2-3 mm, winged at the apex and base.





**Plate 25. PEDALIACEAE:** *Sesamum alatum* 1, flowering and fruiting branches and basal leaf. *Pedalium murex* 2, flowering and fruiting branch. *Rogeria adenophylla* 3, flowering and fruiting branch. **LENTIBULARIACEAE:** *Utricularia gibba* 4, habit; bladder on a branchlet, and capsule with calyx (right). *Utricularia inflexa* 5, habit; bladder on a branchlet, and capsule (left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

De; sandy plains. Egypt, Sudan, Ethiopia, Kenya, Zimbabwe, Mozambique, Botswana, Mali, Nigeria, Ghana, Senegal.

## 2. *Pedaliium* L.

Annuals; stems rather succulent, branched or not; leaves petiolate, entire or coarsely dentate; flowers solitary in the leaf-axils, with glands at the base of the pedicel; calyx small; corolla-tube narrowly funnel-shaped; limb 5-lobed, spreading; stamens included; staminode often present; ovary 2-celled, with 2 ovules in each cell; fruit indehiscent, 4-angled, with a spine at each basal angle; seeds 1-2 in each cell. 1 species, Old World tropics.

### 1. *Pedaliium murex* L., Syst. Nat., ed. 10, 1123 (1759).

Sparsely glandular annual 15-50 cm; stems rather succulent, branched from the base or simple, ascending or prostrate; leaves 1-4.5 x 1-2.5 cm, oblong-obovate, slightly fleshy, coarsely dentate, rounded or truncate at the base; petiole 0.5-2.5 cm; flowers solitary in the leaf-axils; calyx-lobes 2-3 mm, lanceolate, acuminate; corolla yellow; corolla-tube 2-2.5 cm, glandular; limb 1.5-2 cm diam., hairy in the throat; lobes suborbicular; fruit 1.5-2 x 0.8-1.2 cm, excluding the spines, 4-angled, sparsely glandular, rugose-tuberculate; seeds 5-6 x 1.5 mm, elongate-elliptic, 3-angled in the upper half.

GE; alluvial and sandy soil. Southeast Egypt, tropical East Africa, Ethiopia, Somalia, Socotra, Arabia, Mozambique, Madagascar, India, Sri Lanka.

## 3. *Rogeria* J. Gay ex Delile

Annuals or perennials; leaves simple, lobed; flowers axillary, conspicuous, subsessile; calyx 5-lobed, persistent or caducous; corolla tubular, slightly bilabiate, the lobes suborbicular; stamens epipetalous at the base of the corolla-tube; anthers ovoid-oblong; ovary 2-locular, each locule divided by a false septum; capsule ovoid, with 2-8 spines at the base, indehiscent; seeds obovoid-angular. 6 species, Brazil, tropical and South Africa.

### 1. *Rogeria adenophylla* J. Gay ex Delile, Cent. Pl. Afr. 78, t. 2, f. 3 (1826).

Perennial 0.5-1.5 m; stems erect, stiff, glandular in the upper part; leaves 4-8 x 3-6 cm, broadly obovate, 3-lobed, the margin remotely spinulose, acute, truncate or shortly cuneate at the base, mealy-glandular on the lower surface; petiole 3-6 cm; flowers subsessile, 1-3 in the leaf-axils; corolla-tube 4-5 cm, finely white-mealy outside, the limb dull purple; capsule 2.5-3 x 1 cm, conical, not angled, with 4 spines 2-3 mm below the middle, sometimes with 4 other shorter spines between the longer ones, white-mealy, indehiscent; seeds 3-4 x 1.5-2 mm, ovoid-angular, pitted, dark brown.

GE; sandy soil. Southeast Egypt, Sudan, tropical West Africa, Cape Verde Islands.

## LENTIBULARIACEAE

### L. Boulos

Aquatic or terrestrial carnivorous herbs; leaves alternate or in a basal rosette, entire or much-divided, with specialized traps for capturing small organisms; traps with digestive

glands; scapes bracteate or ebracteate; flowers bisexual, 5-merous, solitary or in racemes; calyx 2-5-lobed, persistent; corolla bilabiate, spurred or saccate at the base; stamens 2, epipetalous, sometimes 2 staminodes present; anthers with 1 theca; ovary superior, 1-locular; stigma equally 2-lobed; placentation free-central; fruit a capsule, dehiscent by valves or slits, sometimes indehiscent and 1-seeded; seeds minute; endosperm absent. 3 genera, 245 species, cosmopolitan.

### 1. *Utricularia* L.

Annuals or perennials, rootless; stems horizontal; flowers in erect racemes; terrestrial in damp places and usually with simple inconspicuous leaves, or aquatic with numerous conspicuous leaves divided into linear to filiform segments; leaves bearing small bladders which trap minute organisms; calyx 2-lipped, divided almost to base, usually accrescent; corolla 2-lipped, yellow; lower lip  $\pm$  spurred, with a gibbous palate; upper lip usually smaller; capsule globose, circumscissile, indehiscent or dehiscent by pores or slits; seeds usually numerous. 214 species, tropical and temperate regions.

1. Scape filiform, with 1-2 scales or scales frequently absent; corolla yellow, often with reddish-brown nerves; capsule 2-3 mm 1. *U. gibba*  
+ Scape 1-2 mm thick, with a whorl of 5-10 spongy floats near the base; corolla white or pale mauve, rarely yellow with purple nerves; capsule c. 5 mm 2. *U. inflexa*

#### 1. *Utricularia gibba* L., Sp. Pl., ed. 1, 18 (1753).

Syn. *Utricularia exoleta* R. Br., Prodr. Fl. Nov. Holl. 430 (1810).

*Utricularia gibba* L. subsp. *exoleta* (R. Br.) P. Taylor, Mitt. Bot. München 4: 101 (1961).

Aquatic annual or perennial; stems radiating from the base of the scape; leaves unequally forked from the base, the segments capillary, each 1-3 times forked; bladders 1-1.5 mm; inflorescence 2-8 cm; flowers 1-4; scape filiform, with 1-2 scales 1 mm or frequently absent; pedicel 2-8 mm, erect in fruit; corolla 5-7 mm, yellow, often with reddish-brown nerves; upper lip 3-4 mm broad, ovate, obtuse, obscurely 3-crenate; lower lip with prominent 2-gibbous palate, entire,  $\pm$  as long as the conical spur; capsule 2-3 mm, globose; seeds 0.8-1 mm, irregularly winged.

O; ditches and springs. Portugal, Spain, North and tropical Africa, Madagascar, tropical Asia, northern Australia, New Zealand.

#### 2. *Utricularia inflexa* Forssk., Fl. Aegypt.-Arab. 9 (1775).

Syn. *Utricularia stellaris* L.f., Suppl. Pl. 86 (1781).

Suspended aquatic, annual or perennial; stems 20-50(-80) cm, filiform, terete, sparsely branched; leaves 1-6 cm, numerous, divided from the base into 3-6 segments; secondary segments pinnate, the ultimate segments capillary; bladders 1-3 mm, numerous on the secondary segments; scape 1-2 mm thick, with a whorl of 5-10 spongy floats near the base; flowers 5-12; pedicel 1-5 mm, filiform; corolla 7-9 mm, white or pale mauve, rarely yellow with purple nerves; capsule c. 5 mm, globose; seeds 0.5 mm, 4-6-angled.

N (Nile delta); rice fields, ditches, pools. North, tropical and South Africa, Madagascar, India.

NOTE: The type of *Utricularia inflexa* was collected in Rosetta, Egypt, 2-6 November 1761, Forsskål 355 (C!).

## PLANTAGINACEAE

Sven Snogerup & L. Boulos

Annual or perennial herbs or dwarf shrubs; monoecious or dioecious; leaves usually in basal rosettes, sometimes opposite or alternate on the stem, exstipulate, simple, entire or serrate or pinnatifid, with parallel veins, usually with a broad, sheathing base; inflorescence usually a dense spike or head, rarely flowers solitary or in groups; bracts well developed, distinct in shape from the leaves; flowers small, bisexual or rarely unisexual, 2- or 4-merous, actinomorphic or the sepals bisymmetrically arranged; sepals persistent; corolla sympetalous, scarious; stamens 4 or rarely 1-2, inserted on the corolla-tube; filaments usually long, the anthers usually exerted, conspicuous, 2-locular, opening lengthwise; ovary superior, 1- to 4-locular; style 1; ovules 1 to many in each loculus, axile or basal; fruit a circumscissile capsule or an indehiscent achene; seeds peltately attached, endospermic, with straight or rarely curved embryo, often mucilaginous when wet. 3 genera, about 275 species, the large and widespread *Plantago* in various environments, of wide distribution, but mainly temperate regions, the two small genera in Europe and South America.

### 1. *Plantago* L.

- Literature: Pilger, R. 1922. Beiträge zur Kenntnis der Gattung *Plantago*. I. Die altweltlichen Arten der Sektion *Leucopsyllium* Decne. & II, Die Sektion *Hymenopsyllium* Pilger. Feddes Repert. 18: 449-475.
- Pilger, R. 1928. Beiträge zur Kenntnis der Gattung *Plantago* VIII, Weitere Bemerkung über die altweltlichen Arten der Sektion *Leucopsyllium* Decne. Feddes Repert. 24: 317-322.
- Pilger, R. 1930. *Plantago coronopus* L. und verwandte Arten. Feddes Repert. 28: 262-322.
- Pilger, R. 1937. Plantaginaceae in A. Engler: Das Pflanzenreich, IV, 269, 102. Heft. Leipzig.
- Zohary, M. 1938. On the *Plantago* species of the Near East. Pal. J. Bot., Jerusalem ser 1: 225-232.
- Agnew, A.D.Q. & Chalabi-Kabi, S. 1963. On a new species of *Plantago* from Iraq, Notes Roy. Bot. Gard. Edinb. 25: 55-59.
- Rahn, K. 1978. Nomenclatural changes within the genus *Plantago*, infraspecific taxa and subdivisions of the genus. Dansk Bot. Tidsskr. 73: 106-111. Copenhagen.
- Rahn, K. 1979. *Plantago* ser. *Ovatae*. A taxonomic revision. Dansk. Bot. Tidsskr. 74: 13-20. Copenhagen.

Annual or perennial herbs or shrubs, monoecious; plant scapose with all leaves spirally arranged in a basal rosette, or with a simple or sparsely branched stem and then leaves opposite (rarely some alternate); inflorescence a usually dense spike or head; flowers bisexual, 4-merous; sepals sometimes equal, more usually differentiated into 2 anterior (abaxial) and 2 differently shaped posterior (adaxial), variably connate or free, usually keeled; corolla hypocrateriform or rotate, the tube sometimes bent; stamens inserted on the corolla-tube, alternating with the lobes; ovary 2- or 4-locular, ovules 2 to many; capsule circumscissile, membranous. About 270 species, cosmopolitan.

*Plantago* is a genus with several critical groups. Floral characters are sometimes subject to modification and the variations between populations of the same species are often considerable.

Uses: The seeds of several *Plantago* species have often been used medicinally. Because of their high mucilage content they have proved effective against different diarrhoea-causing diseases. Among the Egyptian species, at least *P. albicans*, *P. exigua*, *P. afra*, *P. arenaria* and *P. ovata* have been used for this purpose.

- |   |                           |
|---|---------------------------|
| 1. All or most leaves opposite on a well developed stem                           | 2                         |
| + Leaves alternate on the stem or in dense rosettes                               | 7                         |
| 2. Densely glandular shrublet   | 1. <i>P. sinaica</i>      |
| + Herbs; indumentum various   | 3                         |
| 3. Flower centre very dark; posterior sepals flat                                 | 2. <i>P. phaeostoma</i>   |
| + Flower centre light brownish; posterior sepals with a dorsal wing or ridge      | 4                         |
| 4. Lower bracts with broad clasping base and a laminar leaflike part              | 5                         |
| + Lower bracts ovate to lanceolate with a narrow tip                              | 6                         |
| 5. Leaves linear-spathulate; posterior sepals equal                               | 3. <i>P. squarrosa</i>    |
| + Leaves narrowly linear to lanceolate; posterior sepals unequal                  | 4. <i>P. arenaria</i>     |
| 6. Lower bracts 1-3 cm, usually exceeding the spike                               | 5. <i>P. exigua</i>       |
| + Lower bracts 3-8 mm, shorter than the spike                                     | 6. <i>P. afra</i>         |
| 7. Corolla-tube hairy   | 8                         |
| + Corolla-tube glabrous   | 12                        |
| 8. Leaves subglabrous, entire   | 11. <i>P. crassifolia</i> |
| + Leaves hairy, usually with teeth or lobes                                       | 9                         |
| 9. Scapes procumbent-recurved; sepals long-hairy                                  | 7. <i>P. crypsoides</i>   |
| + Scapes ascending-erect; sepals short-hairy or glabrous                          | 10                        |
| 10. Scapes shorter than leaves, clavate   | 9. <i>P. commutata</i>    |
| + Scapes longer than leaves, uniformly thick throughout                           | 11                        |
| 11. Spikes 0.5-3 cm; dorsal wing of posterior sepals<br>0.2-0.5 mm wide, scarious | 8. <i>P. coronopus</i>    |
| + Spikes 3-6 cm; dorsal wing of posterior sepals c. 1 mm wide,<br>herbaceous      | 10. <i>P. macrorhiza</i>  |
| 12. Anterior sepals united for $\frac{1}{4}$ or more of their length              | 13                        |
| + Anterior sepals free or united for less than $\frac{1}{4}$                      | 14                        |
| 13. Anterior sepals long-hairy  | 12. <i>P. lagopus</i>     |
| + Anterior sepals glabrous or with few short hairs                                | 13. <i>P. lanceolata</i>  |
| 14. Leaves broadly ovate, distinctly petiolate                                    | 14. <i>P. major</i>       |
| + Leaves linear to lanceolate or linear-spathulate                                | 15                        |
| 15. Corolla-lobes with long brownish hairs beneath                                | 17. <i>P. ciliata</i>     |
| + Corolla-lobes glabrous or with few, short hairs                                 | 16                        |

- |   |                             |
|---|-----------------------------|
| 16. Stem conspicuous; sepals glabrous                 | 17                          |
| + Stem short or absent; sepals hairy                  | 18                          |
| 17. Plant green, dark when dry; seeds 4.5-6 mm        | 16. <i>P. amplexicaulis</i> |
| + Plant grey to white-hairy; seeds 2-2.5 mm           | 20. <i>P. ovata</i>         |
| 18. Corolla-lobes narrowly ovate, often hairy beneath | 18. <i>P. cylindrica</i>    |
| + Corolla-lobes ovate to orbicular, glabrous          | 19                          |
| 19. Leaves mostly with prominent teeth or lobes       | 15. <i>P. notata</i>        |
| + Leaves entire or with few, small teeth              | 20                          |
| 20. Spikes cylindrical, usually lax below             | 19. <i>P. albicans</i>      |
| + Spikes ovoid, very dense                            | 20. <i>P. ovata</i>         |

In the descriptions, measurements of the leaves include the petiole, those of scapes do not include the spike.

1. ***Plantago sinaica*** (Barn.) Decne. in A. DC., Prodr. 13(1): 733 (1852)  
 Syns. *Plantago psyllium* L. var. *sinaica* Barn., Monogr. Plantagin. 49 (1845).  
*Plantago arabica* Boiss., Diagn. Pl. Orient. 12: 94 (1853), nom. illeg.  
*Psyllium sinaicum* (Barn.) Holub, Folia Geobot. Phytotax. Bohem. 8: 173 (1973).

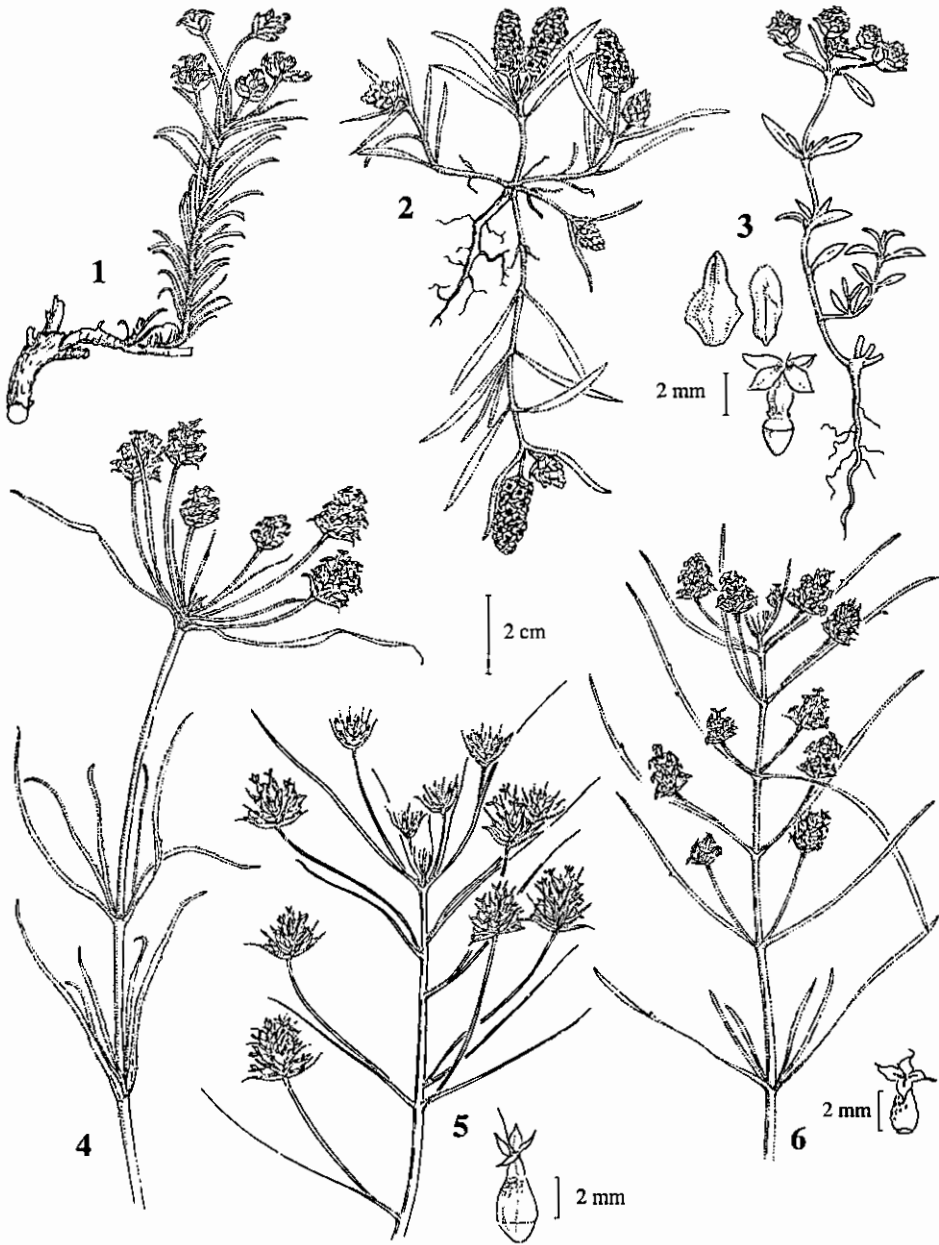
Scabrid and densely glandular-hairy shrublet, (5-)20-50 cm; old stems woody, much-branched, covered below with the bases of dead leaves, densely leafy above; leaves 1-5 x 0.1-0.3 cm, opposite with united, clasping bases, linear, subacute; peduncles (1-)2-6(-10) cm, from the axils of subapical leaves, erect; spikes 0.5-1.3 x 0.7-1 cm, globose or almost so, dense; bracts 3-10 x 2-4 mm; lower broadly ovate, with apical lamina; the upper ovate-orbicular, with broad scarious margins; sepals 3.5-5 x 1.5-3 mm, ± obliquely ovate, broadly scarious-margined; anterior flat, connate for c. 0.5 mm; posterior unequal, one lateral, cymbiform, one behind the flower, flat; corolla glabrous; corolla-lobes 2.2-2.5 x 0.9-1.3 mm, apiculate; capsule 2-seeded; seeds 2.5 mm, cymbiform.

S; desert mountains, rocky wadis, 1800-2100 m. Endemic.

NOTE: The type of *Plantago psyllium* L. var. *sinaica* was collected in Sinai.

2. ***Plantago phaeostoma*** Boiss. & Heldr. in Boiss., Diagn. Pl. Orient., ser. 2, 4: 71 (1859).

Densely glandular-hairy annual 3-20 cm, stems usually branched from the base, the branches ascending, often as tall as the stem; leaves 1-3.5(-5) x 0.1-0.3 cm, opposite, with clasping, united bases, narrowly linear, subacute, entire or with few teeth, the margins sometimes involute; peduncles 0.5-5 cm, the apical short, the lateral longer, ascending, usually shorter than the leaves, terete; spikes 0.7-2 x 0.7-1 cm, cylindrical to ovoid, dense; bracts 2.5-5(-12) x 1.5-2 mm, broadly scarious-margined, the lower broadly ovate with apical lamina, the upper ovate; sepals 2.5-4 mm, with basally broad scarious margins; the anterior flat, connate at base for 0.5 mm, obliquely ovate to elliptical; posterior ovate, flat; corolla glabrous, the lobes 1.8-2.2 x 1.3-1.6 mm, cuspidate, with very dark centre; capsule 2-seeded; seeds 1.9-2.2 mm, cymbiform.



**Plate 26.** PLANTAGINACEAE: *Plantago sinaica* 1, flowering and fruiting branch from a woody base. *Plantago phaeostoma* 2, habit. *Plantago squarrosa* 3, habit; lower and middle bracts (up left); flower (down left). *Plantago arenaria* 4, flowering and fruiting branch. *Plantago exigua* 5, flowering and fruiting branch; flower (down right). *Plantago afra* 6, flowering and fruiting branch; flower (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Sally Dawson.

M, D, S; desert wadis and depressions, calcareous hillsides. Libya, Egypt, Palestine.

NOTE: The type of *Plantago phaeostoma* was collected near Alexandria, Egypt, by Samaritani.

3. **Plantago squarrosa** Murray, Commentat. Soc. Regiae Sci. Gott. 4: 38 (1782).

Syns. *Plantago aegyptiaca* Jacq., Coll. 1: 45 (1786).

*Plantago chamaepsyllium*: Zohary, Pal. J. Bot, Jerusalem ser. 1: 229 (1938).

*Plantago sarcophylla* Boiss. ex Zohary, Pal. J. Bot., Jerusalem ser. 1: 230 (1938).

Scabrid and glandular-hairy annual, (3-)10-20(-40) cm; main stem vegetative, branched from the base and usually overtopped by ascending branches (small specimens often with stunted stem and only one branch); leaves (0.5-)1-3(-5) x 0.1-0.3 cm, opposite, with clasping, united bases, linear-spathulate, blunt to acute, entire; scapes 0.5-7 cm, the apical short, the lateral longer, terete; spikes 0.5-1(-2.5) x 0.5-1 cm, globose to short-cylindrical, dense; bracts (2-)3-7(-30) x 1.2-5 mm, variable between specimens, the lower broadly ovate with apical lamina, the upper elliptical-obovate, with scarious margins; sepals 2.5-4 mm, broadly scarious-margined; anterior flat, connate for less than 0.5 mm, obliquely elliptic to obovate; posterior equal, often oblique, ovate; cymbiform, with dorsal wing 0.2 mm wide; corolla-lobes 1.8-2.5 x 1-1.3 mm, acute; capsule 2-seeded; seeds 1-2.5 mm, mostly cymbiform.

N, M, De, S; sandy and calcareous ground. Libya, Egypt, Palestine, Syria, Turkey, Cyprus, Greece, Crete.

NOTE: The type of *Plantago squarrosa* was cultivated in Göttingen from seeds collected in Egypt by J.A. Murray. Descriptions and material of the two presumed species described by Zohary from Palestine (listed here as synonyms) are identical with individuals of *P. squarrosa* growing under extreme drought.

4. **Plantago arenaria** Waldst. & Kit., Descr. Icon. Pl. Hung. 51 (1801).

Syns. *Plantago indica* L., Syst. Nat., ed. 10, 896 (1759), nom. illeg.

*Plantago psyllium* L., Sp. Pl., ed. 1, 115 (1753), nom. confus.

*Plantago ramosa* Asch., Fl. Brandenb. 1: 547 (1864), nom. illeg.

*Plantago scabra* Moench, Meth. 461 (1794), nom. illeg.

Hispid and glandular-hairy annual; (10-)15-50(-80) cm; stems erect, usually branched only above, terete; leaves 2-5(-7) x 0.1-0.4 cm, opposite, with clasping, united bases, narrowly linear to lanceolate, entire; peduncles 0.5-7 cm, the apical short, the lateral longer; spikes 0.8-1.5(-2) x 0.7-1 cm, cvoid to shortly cylindrical, dense; bracts 3-10(-15) x 3-5 mm, broadly scarious-margined, the lower broadly ovate with linear apical lamina, the upper obovate to obtriangular; sepals 2.5-4 mm long, ovate to obliquely obovate; anterior connate for up to 0.5 mm, broadly scarious-margined; posterior unequal, scarious except for the midrib, one cymbiform with dorsal wing to 0.2 mm wide, the other broader, ovate, flat; corolla-lobes 2-2.2 x 0.6-0.8 mm, apiculate; capsule 2-seeded; seeds 2.1-3.1 mm, cymbiform.

N, O, M, D, S; sandy and alluvial soils, often as weedy or ruderal. Europe, North Africa, southwest Asia to Pakistan, cosmopolitan as introduced.



5. ***Plantago exigua*** Murray, *Commentat. Soc. Regiae Sci. Gott.* 1: 94 (1779).  
Syn. *Plantago pumila* L.f., *Suppl. Pl.* 125 (1782).

Subglabrous to sparsely glandular-hairy annual, 15-45 cm; stems with ascending branches from the base, terete; leaves 1.5-8 x 0.1-0.2 cm, opposite or a few single, or in whorls of three from clasping base, linear, entire or with few, small, irregular teeth; peduncles 0.5-5 cm, the apical short, the lateral longer, shorter than leaves; spikes 0.7-2 x 0.7-1 cm, ovoid, lax below; bracts 0.4-1.5(-3) x 0.15-0.8 cm, lower bracts 1-3 cm, ovate-lanceolate with apical lamina usually exceeding the spike, the upper similar but shorter, scarious-margined at base; sepals broadly scarious-margined; anterior 4-7 mm, connate for 0.3-0.5 mm, lanceolate with short lamina; posterior 4-4.5 mm, obliquely ovate to lanceolate, cymbiform, usually at least one with dorsal wing to 0.1 mm wide; corolla 1.5 x 0.8-1 mm, glabrous, the lobes apiculate; capsule 2-seeded; seeds 2.8-3.8 mm, cymbiform.

N, De; sandy and alluvial soils, mostly as a weedy escape from cultivation. Egypt, Arabia, eastwards to Pakistan and India.

6. ***Plantago afra*** L., *Sp. Pl.*, ed. 2, 168 (1762).  
Syns. *Plantago psyllium* L., *Sp. Pl.*, ed. 2, 167 (1762), non L., *Sp. Pl.*, ed. 1, 115 (1753).  
*Plantago parviflora* Desf., *Fl. Atlant.* 1: 141 (1798).

Densely glandular- or rarely eglandular-hairy annual, 3-35 cm; stems erect, variously branched, terete; leaves 2-5(-7) x 0.1-0.5 cm, opposite, with broad, clasping, united bases, narrowly linear to lanceolate, entire or rarely remotely serrate; peduncles 0.5-3 cm, the apical short, the lateral longer, shorter than to equalling the leaves, terete; spikes 0.5-1.5 x 0.5-1 cm, globose to ovoid, dense; bracts 2.5-6(-10) x 1.5-4 mm, the lower 3-8 mm, shorter than the spike, ovate with small apical lamina, the upper broadly ovate, broadly scarious-margined; sepals 2-3.5 mm, broadly scarious-margined; anterior connate at base for 0.2-0.5 mm, obliquely lanceolate; posterior ovate, cymbiform, with dorsal ridge or wing to 0.2 mm wide; corolla glabrous, the lobes 1.5-2.2 x 0.6-1 mm, apiculate; capsule 2-seeded; seeds 2.5-3.5 mm, cymbiform.

De, R, GE, S; sandy wadis, temporarily wet places. Canary Islands, Mediterranean region, Sinai, Arabia, eastwards to Pakistan and southwards to Sudan.

NOTE: Plants from the Red Sea area and Gebel Elba generally have longer and narrower leaves and an indumentum of predominantly glandular hairs.

7. ***Plantago crypsoides*** Boiss., *Fl. Orient.* 4: 888 (1879).

Scapose, hairy annual 2-5 cm; scapes procumbent-recurved; leaves 2-14 x 0.1-0.7 cm (excluding the lobes), in a rosette, with paired teeth or lobes to 1.5 cm, rarely entire; peduncles (6-)12-36(-50), 0.5-3 cm in flower, conspicuously shorter than the leaves, terete, becoming longer and swollen in fruit, prostrate to recurved; spikes (0.5-)1-2 x 0.6-0.8 cm, ovoid to subcylindrical, dense; bracts 2-3.5(-4.5) x 0.8-2.5 mm, broadly ovate to ovate or triangular, broadly scarious-margined; sepals 2-3 mm, long-hairy broadly scarious-margined; anterior flat, long-hairy, broadly ovate; posterior cymbiform-conduplicate, with dorsal wing 0.3 mm wide; corolla-tube hairy, lobes 1.2-1.5 x 0.7-0.9 mm, apiculate; capsule usually 3-seeded; seeds 1.1-1.5 mm, elliptic-lenticular, with 0.2 mm wide groove on one side.



Plate 27. PLANTAGINACEAE: habit of: *Plantago crypsoides* 1. *Plantago coronopus* 2. *Plantago crassifolia* 3. *Plantago lagopus* 4. *Plantago lanceolata* 5. *Plantago major* 6; long inflorescence (left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Sally Dawson.

N, O, M, De, S; sandy and often saline soils, mostly in wadis and depressions. Libya, Egypt.

NOTE: Several syntypes of *Plantago crypsoides* were collected near Alexandria, Egypt.

8. *Plantago coronopus* L., Sp. Pl., ed. 1, 115 (1753).

Sparsely to densely hairy scapose perennial, often flowering in the first year, with 1 or several rosettes and a taproot to 5 mm thick; leaves 3-8 x 0.2-0.5 cm (excluding the lobes), in a rosette, from wide sheathing base, linear, usually with paired teeth or lobes to 1 cm; peduncles usually 5-15, 4-10 cm, equalling or longer than the leaves, usually much longer than the spike, terete, remaining thin in fruit, erect or ascending; spikes 0.5-3 cm, dense; bracts 2-3 mm, broadly ovate, broadly scarious-margined; sepals 2-3 mm, the anterior free, scarious-margined; posterior cymbiform to conduplicate, scarious except for the midrib, with dorsal wing 0.2-0.5 mm wide; corolla-tube hairy, the lobes 1-1.3 x 0.5-0.8 mm, apiculate; capsule 3-4-seeded; seeds 1-1.3 mm, lenticular, with 0.2 mm wide groove on one side.

M; salt marshes, coastal plains. Europe, North Africa and southwest Asia to Pakistan, naturalized elsewhere.

NOTE: *Plantago coronopus* is only known from two collections in Egypt: Abu Mandour and Sidi Abdel Rahman, western Mediterranean coastal region.

9. *Plantago commutata* Guss., Suppl. Fl. Sicul. Prodr., 46 (1832).

Syns. *Plantago coronopus* L. subsp. *commutata* (Guss.) Pilg., Feddes Repert. 28: 287 (1930).

*Plantago weldenii* sensu auct., non Rchb. (1831).

Scapose, sparsely to densely hairy annual or biennial, 1-5(-10) cm; scapes shorter than leaves, clavate; leaves 2-8(-10) x 0.2-0.5 cm (excluding the lobes), in a rosette, entire or with paired teeth or lobes; peduncles 5-20(-50), (0.5)1-6 cm, shorter than to equalling the leaves, terete, clavate in fruit and then usually 1.5-3 mm thick below the spike, ascending or rarely procumbent or erect; spikes 1-5(-7) x 0.3-0.5 cm, dense, often curved-ascending; scapes and floral parts hardening in fruit; bracts 2-2.5 x 1.5 mm, the lower broadly ovate to triangular, the upper ovate, broadly scarious-margined; sepals 2-3 mm, broadly scarious-margined; anterior oblique, flat; posterior cymbiform to conduplicate with 0.3-0.5 mm wide dorsal wing; corolla-tube hairy, the lobes 1-1.2 x 0.7-1 mm, apiculate, glabrous; capsule 3-seeded; seeds 1.3-1.5 mm, lenticular with 0.2 mm wide groove on one side.

N, O, M, De, S; depressions, wadis, river banks, usually near sea level, sometimes in saline soils. Central and eastern Mediterranean region.

10. *Plantago macrorhiza* Poir., Voy. Barb. 2: 114 (1789).

Densely hairy scapose perennial, 10-20 cm, with a taproot to 5 mm thick; stems to 3 cm; leaves 4-10 x 0.2-0.5 cm (excluding the teeth), in a rosette, from wide sheathing base, linear to narrowly spatulate, with paired teeth or lobes to 5 mm; peduncles 8-12 cm, longer than the leaves, terete, remaining thin in fruit; spikes 3-6 x 0.5-1 cm, cylindrical, dense; bracts 2.5-6 x 2.5-5 mm, ± broadly ovate, with lamina-like tip, broadly scarious-margined; sepals 3-3.5 mm, broadly ovate; anterior flat, oblique, with inner side broadly

scarios-margined and outer herbaceous; posterior cymbiform-conduplicate, scarios except for the midrib, with dorsal wing to 1 mm wide; corolla-tube hairy, lobes 1.8-2.0 x 1.0-1.1 mm, apiculate; capsule 3-seeded; seeds 1-1.2 mm, lenticular, with 0.2 mm wide groove on one side.

M (Esueh, coll. Ascherson 1887!); probably in temporarily wet depressions, only found once in Egypt. Mediterranean region from southwest Spain to Egypt, with a very scattered distribution.

NOTE: The above description refers only to Egyptian material.

11. ***Plantago crassifolia*** Forssk., Fl. Aegypt.-Arab. 31 (1775).

Syn. *Plantago maritima* L. subsp. *crassifolia* (Forssk.) Holmboe, in Bergens Mus. Skr., ser. 2, 1(2): 170 (1914).

Sparsely hairy perennial, 10-30 cm, with a deep root to 1 cm thick; leaves (2-)5-15(-35) x 0.2-1 cm, in a rosette, usually shorter than the inflorescence, from sheathing base, narrowly linear, entire, fleshy, subglabrous; peduncles (2-)10-20 cm, erect, terete; spikes (1-)2-12 x 0.3-0.6 cm, cylindrical, dense above, usually lax at base; flowers suberect; bracts 1.8-3 x 2 mm, broadly ovate, acute, narrowly scarios-margined; sepals 2.5-3.5 mm, ovate; anterior flat, scarios-margined; posterior cymbiform-conduplicate with dorsal wing to 0.8 mm wide, scarios except for the midrib; corolla-tube sparsely hairy, the lobes 1.5-1.8 x 0.8-1 mm, apiculate, glabrous; capsule 2-seeded; seeds 1.4-2 mm, lenticular with 0.5 mm wide groove on one side.

M; salt marshes and depressions near sea level. Mediterranean region.

NOTE: The holotype of *Plantago crassifolia* was collected in Alexandria, Egypt, in 1761, Forsskål 261 (C).

12. ***Plantago lagopus*** L., Sp. Pl., ed. 1, 114 (1753).

Syn. *Plantago lusitanica* L., Sp. Pl., ed. 2, 1667 (1763).

Eglandular-hairy, scapose annual or short-lived perennial, 5-50 cm; leaves (2-)5-20 x (0.2-)1-2(-4) cm, in a rosette, from wide sheathing base, oblanceolate, petiolate, entire or irregularly dentate, 1-7-veined; peduncles usually 5-20, (5-)10-50 cm, longer than the leaves, usually obtusely 6-angled; spikes (0.5-)1-2.5(-7) x 0.7-1.2 cm, ovoid to cylindrical, crispate-hairy; bracts 2-7 x 1-2 mm, ovate to obovate, broadly scarios-margined; vestigial bracteoles rarely present; sepals (1.5-)2-3 mm, very broadly scarios-margined; anterior connate for  $1/4$ - $3/4$ , flat, obliquely ovate to elliptical, long-hairy; posterior ovate or almost oblong, cymbiform-conduplicate, with dorsal edge or wing to 0.2 mm wide; corolla glabrous, the lobes 1.8-2.5 x 1.3-1.8 mm, apiculate; capsule 2-seeded; seeds 1.8-2.3 mm, shallowly cymbiform.

N, O, M; weed of irrigated gardens and olive groves, natural winter-wet ground. Mediterranean region, southwest Asia to Pakistan.

13. ***Plantago lanceolata*** L., Sp. Pl., ed. 1, 113 (1753).

Subglabrous to sparsely eglandular-hairy scapose perennial, 10-30 cm; leaves 6-12 x 0.8-2 cm, in a rosette, from wide clasping base, linear-lanceolate to oblanceolate, entire

or with a few small teeth, 5-7-veined; peduncles 3-20, mostly 15-25 cm, obtusely 5-angled; spikes 0.5-5 x 0.8-1.3 cm, cylindrical, rarely ovoid, dense; bracts 2.5-4.5 x 2-3 mm, the lower ovate to broadly ovate, the upper ovate to orbicular, broadly scarious-margined; sepals c. 2.5 mm, scarious except for midribs; anterior flat, united almost to the top, glabrous or with few short hairs; posterior lanceolate, cymbiform with a low dorsal wing; corolla-lobes 2.2-2.5 x 1.3-1.5 mm, acute to apiculate; capsule 2-seeded; seeds 2.2-2.5 mm, cymbiform.

N; rare, irrigated gardens and roadsides. Europe, North Africa, southwest Asia, cosmopolitan as introduced.

NOTE: *Plantago lanceolata* is probably recently introduced to Egypt.

14. **Plantago major** L., Sp. Pl., ed. 1, 112 (1753).

Syns. *Plantago intermedia* Gilib., Hist. Pl. Eur., ed. 2, 1: 125 (1806);

*Plantago major* L. subsp. *intermedia* (Gilib.) Lange, Haandb. Danske Fl., ed. 2: 714 (1859).

Glabrescent to sparsely pubescent perennial, 10-60 cm, with a taproot to 1 cm thick; leaves 4-25 x 2.5-16 cm, in a rosette, broadly ovate, 4-9-veined, distinctly petiolate; peduncles 7-35 cm, usually exceeding the leaves, erect or ascending, terete, often striate; spikes 3-15(-35) x 0.4-1 cm, cylindrical, dense throughout or lax below; bracts 1.5-2.5 x 1.5 mm, ovate, narrowly scarious-margined; sepals all similar, 1.5-2 x 1.5-2 mm, orbicular-obovate, obtuse to subacute, scarious-margined; corolla glabrous, the lobes 0.7-1.0 x 0.6-0.8 mm, acute; capsule 10-25-seeded; seeds 0.8-1.1 mm, rounded-angular.

N, O, M, S; Nile and canal banks, irrigated fields, open moist ground. Europe, Mediterranean region, Sinai, Arabia to Central and northern Asia, cosmopolitan as introduced.

NOTE: The Egyptian plants include only part of the total variation and do not fit well with any of the subspecies accepted in many Floras.

15. **Plantago notata** Lag., Gen. Sp. Pl. 7 (1816).

Sparsely to densely-eglandular hairy scapose annual, 5-25 cm; leaves (2-)5-10(-20) x (0.2-)0.5-1 cm, in a rosette, from broad sheathing base, linear to narrowly lanceolate, with mostly forward-pointing, to 1(-2) cm teeth or lobes, or rarely entire, 1-5-veined; peduncles mostly 5-20, (0.2-)5-25 cm, erect to ascending, terete; spikes 0.5-3(-5) x 0.5-1.2 cm, cylindrical or rarely globose, dense, villous when young; bracts 2-3.5 x 3-4 mm, the lower broadly ovate, the upper obovate to obtriangular, scarious except for the midrib; sepals 1.8-2.5 mm, all similar and free, ovate to elliptic or the posterior rarely obovate, scarious except the basal part of midrib; corolla-lobes 1.5-2 x 1.5-2 mm, obtuse or mucronate; capsule 2-seeded; seeds 1.7-2.0 mm, cymbiform.

M, S; desert wadis and sandy fields, 0-700 m. Spain, North Africa, southwest Asia to Iran.

16. **Plantago amplexicaulis** Cav., Icon. 2: 22 (1793) subsp. **bauphula** (Edgew.) Rech. f., Fl. Iranica 15: 11 (1965).

Syn. *Plantago bauphula* Edgew., Hook. J. Bot. 2: 285 (1840).

Eglandular-hairy short-stemmed annual, 10-40 cm, green, dark when dry; stems



**Plate 28. PLANTAGINACEAE:** *Plantago notata* 1, habit. *Plantago amplexicaulis* 2, flowering and fruiting branch. *Plantago ciliata* 3, habit. *Plantago cylindrica* 4, habit. *Plantago albicans* 5, habit. *Plantago ovata* 6, habit. All drawings to the same scale, except the enlarged parts (scale given). Drawn by Sally Dawson.

occasionally to 5(-20) cm, simple or sparsely branched, terete; leaves 3-18 x 0.5-1.5 cm, alternate, from wide sheathing base, linear to oblanceolate, petiolate, entire or remotely dentate, 1-5-veined; peduncles 2-20(-30) cm, axillary, erect or ascending,  $\pm$  equalling or to 3 times as long as the leaves; spikes 1-3 x 0.8-1.5 cm, ovoid to short-cylindrical, dense; bracts 2.5-5.5 x 1.5-3 mm, broadly ovate to obovate, scarious except for the ridged midrib; sepals 2.5-4 mm, free except at base, ovate to obovate; anterior slightly oblique, broadly scarious-margined; posterior scarious except for basal midrib; corolla-lobes 2.2-3 x 1-1.5 mm, apiculate, with dark spot at base; capsule 2-seeded; seeds 4.5-6 mm, cymbiform with a ridge in the concavity.

N, D, S; sandy and alluvial soils in wadis and desert plains, 0-1500 m. Spain, North Africa, southwest Asia to western India.

17. ***Plantago ciliata*** Desf., Fl. Atlant. 1: 137 (1798).

Densely villous scapose or short-stemmed annual, (2-)5-15 cm; stems to 2(-5) cm, rarely branched; leaves (1-)2-8(-10) x 0.5-2 cm, in a rosette, rarely some cauline, from wide clasping base, lanceolate to obovate-spathulate, petiolate, entire or with few, small teeth, 1.5-veined; peduncles 0.5-6(-10) cm, shorter to slightly longer than leaves, terete; spikes (0.5-)1-4 x 0.7-1 cm, globose to shortly cylindrical, dense; bracts 2.5-4 x 2-3 mm, broadly ovate to lanceolate, scarious-margined; sepals 2-3.2 mm, elliptic to obovate, the anterior oblique, with scarious margin much broader on inner side; posterior: 1 in a side position, 1 behind the flower, slightly cymbiform, scarious with broad midrib; corolla-tube glabrous; corolla-lobes 1.5-2.2 x 0.7-0.9 mm, apiculate, with long brownish hairs beneath; capsule 2-seeded; seeds 1.8-2.5 mm, thick-walled cymbiform.

N, O, M, D, R, GE, S; sandy soil in wadis and other periodically wet places, 0-500 m. Canary Islands, North Africa, Sinai, Arabia, Palestine, Iraq, Iran, Pakistan.

18. ***Plantago cylindrica*** Forssk., Fl. Aegypt.-Arab. 31 (1775).

Densely villous short-lived perennial, or rarely annual, 5-25 cm; stems short, rarely branched at base, with remains of leaves below, mostly buried in sand; leaves 3-17 x 0.2-1.5 cm, in  $\pm$  loose rosettes, narrowly linear-lanceolate, entire, 1-3-veined; peduncles 1-15 cm, mostly shorter than leaves, ascending, terete; spikes 1.5-13 x 0.7-1 cm, cylindrical, dense throughout or lax below, villous; bracts 3-5(-6) x 2-3 mm, obovate to obtriangular or lower orbicular to broadly ovate, broadly scarious-margined; sepals 2.5-4.5 mm, elliptic to narrowly ovate; anterior oblique, with a broad scarious margin at inner side and a narrow one laterally; posterior slightly cymbiform, broadly scarious-margined; corolla-lobes 2.2-3 x 1-1.5 mm, narrowly ovate, apiculate, often hairy beneath; capsule 2-seeded; seeds 2.2-2.5 mm, thick-walled, cymbiform.

M, D, S; desert depressions and wadis, 0-1000 m. Egypt, Palestine, Arabia, Iran, Pakistan.

NOTE: The type of *Plantago cylindrica* was collected in Cairo, Egypt, 1761-1762, Forsskål 255 (C).

19. ***Plantago albicans*** L., Sp. Pl., ed. 1, 114 (1753).

Densely appressed-hairy perennial, 15-35 cm, with short, sparsely branched basal stock and subterranean runners; stems short or to 12 cm, terete; leaves (1-)3-17 x 0.3-1.2(-3)

cm, alternate, in a rosette or dense along the stem, from broad clasping base, linear to lanceolate, acute, entire, often undulate; peduncles (1-)5-30 cm, erect or ascending, usually longer than leaves, terete; spikes 1-15 x 0.7-1 cm, cylindrical, usually lax below; bracts 3-6 x 3-4 mm, the lower broadly ovate, the upper orbicular to obovate, obtuse, broadly scarious-margined; sepals 2.5-4.5 mm, elliptical, cymbiform; anterior oblique, broadly scarious-margined at inner side, herbaceous laterally; posterior scarious except for midrib reaching the apex; corolla-lobes 2.5-3.2 x 1.7-2.5 mm, apiculate, subglabrous; capsule 2-seeded; seeds 3-3.5 mm, thick-walled cymbiform.

M, S; sandy fields and depressions, often in moving sand, usually near sea level. Portugal, Mediterranean region, Sinai.

20. ***Plantago ovata*** Forssk., Fl. Aegypt.-Arab. 31 (1775).

Syn. *Plantago decumbens* Forssk., Fl. Aegypt.-Arab. 30 (1775).

Eglandular grey to white-hairy, scapose or short-stemmed annual, rarely perennial, 1-15 cm, ± stemless; leaves (1.5-)5-8(-25) x (0.1-)0.3-1 cm, alternate, in rosettes, from broad clasping base, linear to lanceolate, acute, entire or with a few small teeth; peduncles 1-10(-30), (0.5-)2-12 cm, erect or ascending, shorter to longer than leaves, terete; spikes (0.5-)1-2(-5) x 0.8-1(-1.5) cm, ovoid, very dense; bracts 1.5-4 x 1.5-3 mm, the lower broadly ovate, the upper orbicular to obovate, broadly scarious-margined; sepals 2-3.5 mm, elliptical to obovate, flat to cymbiform, broadly scarious-margined; anterior free or connate at base; posterior subequal, or one flat and placed behind the flower; corolla mostly glabrous, the lobes 2-3 x 2-2.5 mm, apiculate; capsule 2-seeded; seeds 2-2.5 mm, thick-walled cymbiform.

N, M, D, S; sandy wadis and depressions 0-1200 m. Western North America, Atlantic Islands, Mediterranean region, southwest Asia to Pakistan.

NOTE: The type of *Plantago ovata* was collected in Alexandria, Egypt, in 1762, Forsskål 253 (C!). This species is very variable in habit, but much of this variation seems to depend on the varying access to water. The same plant can probably react as a short-lived annual after a small amount of rain, as a biennial, or after heavy and repeated rains as a short-lived perennial. There is also, especially in Sinai, great variation in indumentum, leaf shape, etc. Here we follow the recent revision by Rahn (1979), infraspecific taxa are not recognized.

***Imperfectly known species:***

***Plantago bellardii*** All., Fl. Pedem. 1: 82 (1785).

This species was reported by Täckholm (1974), but no Egyptian material has been traced. The source of the record was not indicated, probably based on misidentification of dwarfed specimens of some other species such as *P. ovata* or *P. notata*.

***Plantago altissima*** L., Sp. Pl., ed. 2, 164 (1762).

This species was reported as a weed in flower-pots in Orman Garden, Giza, in 1970. We do not consider this sufficient reason to accept it for this Flora. Not known as a successful alien elsewhere, it probably disappeared without establishing any further generations.



## VALERIANACEAE

L. Boulos

17 genera, about 400 species, cosmopolitan, especially north temperate regions. *Valerianella* is the only genus known in Egypt.

### 1. *Valerianella* Mill.

Annuals; stems dichotomously branched; leaves opposite, entire, toothed or lobed; flowers minute, bisexual in dense terminal cymes or solitary in branch-forks; calyx variously lobed or toothed or reduced to a rim; corolla infundibular; corolla-lobes 5, subequal, bluish or pinkish; stamens 3; stigma 3-fid; fruit 3-locular, with 2 sterile locules; pericarp often spongy. About 50 species, northern temperate regions, North Africa.

1. Leaves oblong-linear, entire 1. *V. szovitsiana*  
+ Leaves oblanceolate or narrowly spatulate, toothed or lobed 2
2. Calyx densely hairy inside; lobes narrowly triangular, aristate;  
arista ending in a soft hook 3. *V. discoidea*  
+ Calyx glabrous inside; lobes broadly ovate to suborbicular, mucronate,  
not hooked 2. *V. petrovitchii*

1. *Valerianella szovitsiana* Fisch. & C. A. Mey., Ind. Sem. Hort. Petrop. 3: 48 (1837).  
Syns. *Valerianella aucheri* Boiss., Diagn. Pl. Orient., ser. 1, 3: 58 (1843).  
*Valerianella persica* Boiss., Diagn. Pl. Orient., ser. 1, 3: 58 (1843).

Annual 3-12 cm; stems glabrescent or puberulent; leaves 0.5-2.5 x 0.1-0.4 cm, oblong-linear, entire, glabrous; flowers in terminal cymes, at first dense, later lax, or solitary in branch forks; bracts 2-3 mm, linear; corolla pinkish; fruit 2.5-3.5 x 1 mm, ovoid, flattened; fruiting calyx 2-3-lobed; calyx-lobes unequal, one lateral linear, horizontal, about as long as the fruit, the other lobes much shorter or absent.

D, S; sandy soils. Egypt, Palestine, Turkey, Caucasus, northern Iraq, Saudi Arabia, Iran, Afghanistan, Pakistan, Central Asia.

2. *Valerianella petrovitchii* Asch. in Rohlfs, Kufra 526 (1881).

Pubescent annual 5-15 cm; stems simple or branched, striate; basal leaves 1-2.5 x 0.6-1 cm, oblanceolate, entire or crenate; cauline leaves 2.5-4 x 0.8-1 cm, oblong-linear, sessile, the uppermost smaller, entire or toothed; flowers in dense subglobose terminal cymes; bracts 3-4 x 2-3 mm, broadly ovate, the margins ciliate; bracteoles 3 x 1.5 mm, lanceolate; calyx glabrous inside; calyx-lobes 2-2.5 x 2.5-3 mm, broadly ovate to suborbicular, mucronate, not hooked; corolla pinkish; fruit 2-2.5 x 2.5 mm, oblong-ovate, hirsute.

M, sandy soil. Egypt, Libya.

3. *Valerianella discoidea* (L.) Loisel., Not. Pl. Fl. Fr. 148 (1810).  
Syn. *Valeriana locusta* L. var. *discoidea* L., Syst. Nat., ed. 10, 2: 860 (1759).

Annual 5-20 cm; stems simple or branched, pubescent or glabrescent above; leaves 2-3.5 x 0.5-1 cm, sessile, oblanceolate or spatulate, coarsely toothed; flowers in dense globose heads; bracts 2-3 x 1-2 mm, ovate or lanceolate, membranous, with a mid-nerve, margin ciliate; calyx densely hairy inside; calyx-lobes 6, narrowly triangular, sometimes 1-2-lobed, the apex aristate; arista ending with a soft hook; corolla 1.5 mm, pale lilac; fruit 2 x 2 mm, densely villous.

M, stony ground. Southern Europe, Turkey, North Africa, Cyprus, Syria, Saudi Arabia, Iran.

## DIPSACACEAE

### L. Boulos

Annuals, perennials or low shrubs; leaves opposite or whorled, simple, toothed or lobed; stipules absent; flowers bisexual, in terminal cymes or forming capitula surrounded by phyllaries; receptacle often with bracts or bristles; peripheral flowers often larger and zygomorphic; calyx cupuliform or of awns and plumose bristles, persistent; corolla 4-5-lobed, infundibular; stamens 4, equal, exserted; filaments free, inserted deep on the corolla-tube; ovary inferior, of 2 carpels, 1-locular, 1-seeded, enveloped by an epicalyx of connate bracteoles and ending with a corona or teeth; style 1; stigma 1 or 2-lobed; fruit an achene, generally enclosed in the persistent indurated involucrel. 8 genera, about 250 species, Europe, Asia, Africa, but especially Mediterranean region.

- |   |                          |
|---|--------------------------|
| 1. Phyllaries and bracts of the receptacle similar, scariosus     | 1. <b>Cephalaria</b>     |
| + Phyllaries and bracts of the receptacle not similar, herbaceous | 2                        |
| 2. Calyx with 5 scabrous awns                                     | 2. <b>Scabiosa</b>       |
| + Calyx with 10-24 plumose bristles                               | 3. <b>Pteroccephalus</b> |

#### 1. **Cephalaria** Schrad., nom. conserv.

Annual, biennial or perennial herbs, rarely shrubs; stems ribbed; leaves undivided or pinnatifid; flowers sessile, in ovoid or globose capitula, sometimes radiant; phyllaries multiseriate, scariosus; bracts of the receptacle similar to phyllaries; calyx cupuliform, the margins denticulate or setose; corolla 4-lobed, blue, lilac, white or yellow; fruiting involucrel 4- or 8-angled, tapering at the base, grooved, 4- or 8-dentate or aristate. About 65 species, Mediterranean region to Central Asia, Ethiopia and southern Africa.

1. **Cephalaria syriaca** (L.) Schrad., Ind. Sem. Hort. Götting. (1814).  
Syn. *Scabiosa syriaca* L., Sp. Pl., ed. 1, 98 (1753).

Annual 30-90 cm; stems erect, setose, branched; leaves 3-12 x 1.5-3.5 cm, oblong-lanceolate, entire or serrate, sometimes lobed, connate at the base; upper leaves oblong-linear; flowers in ovoid capitula 1-3 cm. not radiate; phyllaries 2.5-3.5 x 1.5-2.5 mm, ovate, apiculate; receptacular bracts 0.7-1.2 x 0.25-0.5 cm, oblong, with a long awn; corolla 0.8-1.5 cm, bluish; fruiting phyllaries 4-5 mm, with 4 long and 4 short apical teeth; achene 5-6 mm, fusiform, firmly enclosed by the persistent involucrel, brown.

N, M, De, S; cultivated and waste ground. Mediterranean region, Iran.

## 2. *Scabiosa* L.

Annuals or perennials, rarely woody at the base; leaves simple or 1-2-pinnatisect; flowers in globular capitula, usually with long peduncles and radiate; phyllaries herbaceous; receptacular bracts linear-lanceolate; calyx with 5 awns; corolla 5-lobed, white, yellow, pink or purplish; achene enclosed by the persistent involucrel; fruiting involucrel 8-grooved all along or with 8 pits at top of tube and 8 grooves below; corona membranous with many nerves and a flat or conical diaphragm. 80 species, temperate Eurasia, Mediterranean region, East African mountains, South Africa.

- |  |                         |
|--|-------------------------|
| 1. Fruiting calyx with a scarious rotate limb to 1.5 cm diam.                  | 2                       |
| + Fruiting calyx with a narrow limb or none                                    | 4                       |
| 2. Flowers of the capitulum all $\pm$ of equal size, not radiate               | 3. <i>S. aucheri</i>    |
| + Flowers of the capitulum of different sizes, the outer longer and radiate    | 3                       |
| 3. Peduncle 1-2.5 cm   | 1. <i>S. prolifera</i>  |
| + Peduncle to 25 cm  | 2. <i>S. palaestina</i> |
| 4. Flowers of different sizes, the outer radiate                               | 5                       |
| + Flowers $\pm$ of the same size, not radiate                                  | 6                       |
| 5. Upper leaves 1-pinnatisect; calyx-awns 2-5 mm; corolla white or pale violet | 4. <i>S. arenaria</i>   |
| + Upper leaves 2-pinnatisect; calyx-awns 0.5-1.2 cm; corolla purple            | 7. <i>S. tenuis</i>     |
| 6. Peduncle to 10 cm; calyx-awns 6-8 mm  | 5. <i>S. olivieri</i>   |
| + Peduncle 0.5-2.5 cm; calyx-awns 1-2 mm                                       | 6. <i>S. eremophila</i> |

### 1. *Scabiosa prolifera* L., Syst. Nat., ed. 10, 2: 889 (1759).

Pubescent annual 15-50 cm; stems stout, branched; lower leaves petiolate, oblong to narrowly ovate, entire or serrate; upper leaves sessile, lanceolate; peduncle 1-2.5 cm; flowering capitula 3-4 cm diam., radiate; fruiting capitula globose; phyllaries 10-12, slightly shorter than the flowers, lanceolate, hirsute; corolla yellowish-white, the lobes dentate; involucrel obconical, indurate, pilose; corona campanulate, 30-34-nerved; calyx stipitate, the lobes hairy; calyx-awns 4-5 mm, scabridulous, slightly exserted.

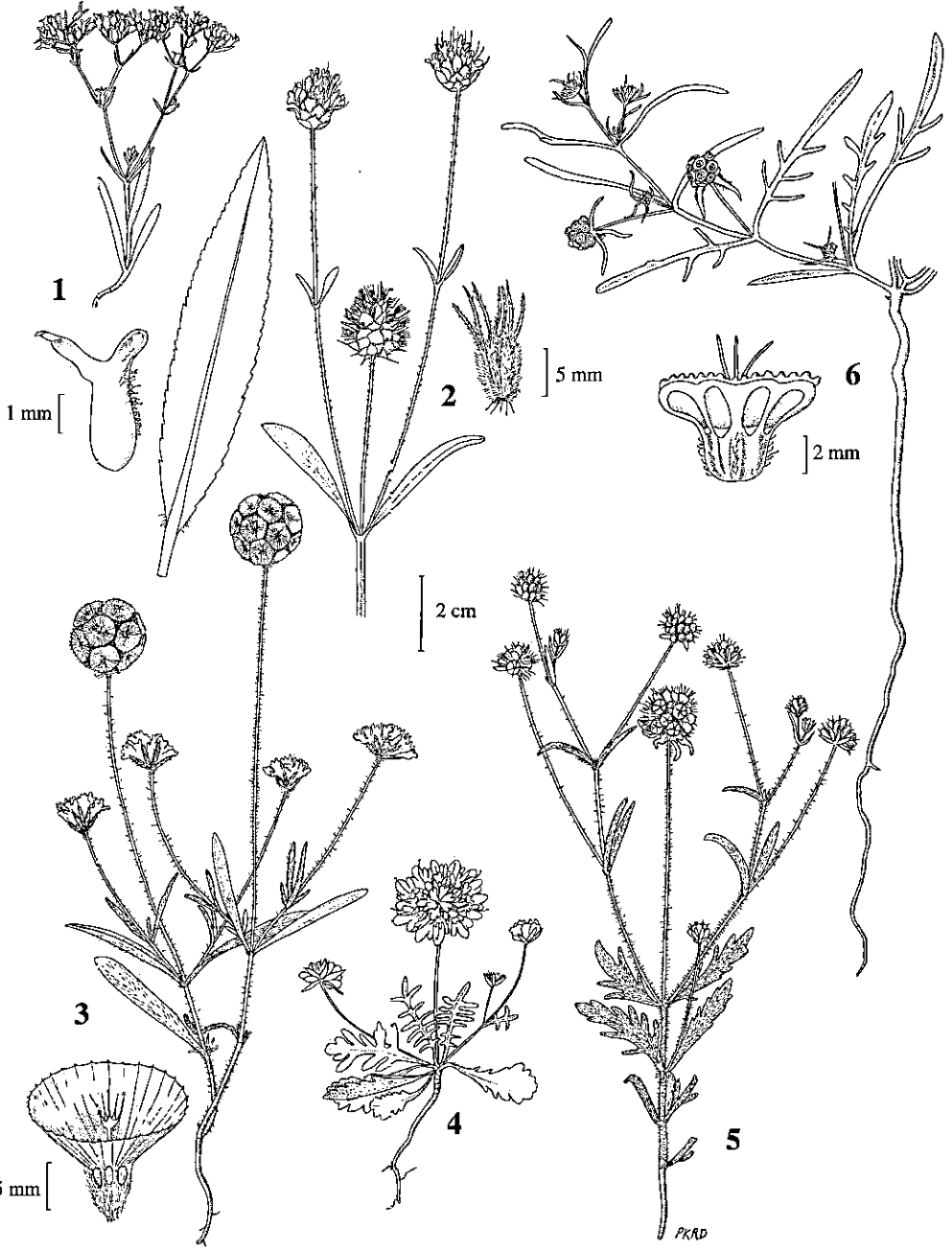
S; waste ground. Cyprus, Sinai, Palestine, Lebanon, Syria, Turkey.

### 2. *Scabiosa palaestina* L., Mant. 37 (1767).

Syn. *Lomelosia palaestina* (L.) Greuter & Burdet, Willdenowia 15: 74 (1985).

Sparsely hairy branched annual, 20-60 cm; lower leaves 3-8 x 1.5-2.5 cm, entire or dentate, petiolate; cauline and upper leaves pinnatipartite to pinnatisect, with linear lobes at the base, sessile; peduncle to 25 cm; capitula 2-3 cm diam., radiate; fruiting capitula 2.5-3.5 cm diam., globose; phyllaries oblong-lanceolate, shorter than the flowers, hirsute; corolla c. 1 cm, yellowish-white, the lobes incised; involucrel c. 5 mm, obconical, indurate, white-hirsute; corona c. 1 cm diam., campanulate, 30-35-nerved, straw-coloured; calyx stipitate; calyx-awns included.

De, S; stony and sandy soils. Egypt, Palestine, Lebanon, Syria, Arabia, Iraq, Iran.



**Plate 29.** VALERIANACEAE: *Valerianella szovitsiana* 1, habit; fruit (down). DIPSACACEAE: *Cephalaria syriaca* 2, flowering and fruiting branch; basal cauline leaf (left); involucre enclosing the achene (right). *Scabiosa palaestina* 3, habit; involucre enclosing the achene (down left). *Scabiosa arenaria* 4, habit. *Scabiosa olivieri* 5, flowering and fruiting branch. *Scabiosa eremophila* 6, habit; involucre enclosing the achene (down left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Patricia Davies.

3. **Scabiosa aucheri** Boiss., Diagn. Pl. Orient., ser. 1, 2: 111 (1843).

Syn. *Lomelosia aucheri* (Boiss.) Greuter & Burdet, Willdenowia 15: 73 (1985).

Pubescent annual 10-20 cm; stems simple or branched; leaves linear-lanceolate, the lower simple, the upper with a pair of small lobes at the base; flowers of the head all  $\pm$  of equal size, not radiate; phyllaries linear-lanceolate, exceeding the corolla: corolla flesh-coloured; involucl densely white-pilose, with deep pits separated by a rib longer than the tube; corona twice as long as the tube, membranous, with 20-24 purple nerves; calyx-awns included.

S; stony ground. Sinai, Palestine, Syria, Lebanon, Turkey, Iraq.

4. **Scabiosa arenaria** Forssk., Fl. Aegypt.-Arab. LXI, no. 89 (1775).

Syns. *Scabiosa rhizantha* Viv., Fl. Libyc. Spec. 6 (1824).

*Sixalix arenaria* (Forssk.) Greuter & Burdet, Willdenowia 15: 76 (1985).

Puberulent-scabrid annual 10-50 cm; stems branched; leaves 2-4 x 1-2 cm, the basal obovate, the upper 1-pinnatisect, with remote or close linear lobes; peduncle to 12 cm; flowering heads 1.5-2 cm diam., radiate; fruiting capitula ovoid; phyllaries hairy, slightly shorter than the flowers; corolla of marginal flowers 1.2-1.8 cm, white or pale violet; involucl 3-3.5 mm, hairy, 8-ribbed; ribs prolonged into the corona forming loops around the pits; corona longer than the involucl; calyx-awns 5, 2-5 mm.

M, De, S; sandy soils. North Africa, Sinai, Palestine.

NOTE: The type of *Scabiosa arenaria* was collected in Rashid (Rosetta), Egypt, in 1761, Forsskål (C). This species appears in some Floras under the name *Scabiosa rhizantha*, e.g. Feinbrun-Dothan, Flora Palaestina 3: 268 (1978); Boulos, Flora of Egypt Checklist 144 (1995), assuming that *Scabiosa arenaria* is a *nomen nudum*. However, according to Hepper & Friis, p. 151 (1994), the name *Scabiosa arenaria* is validated by the description "*Flore albo; calyce longiore,*" and thus is accepted against *Scabiosa rhizantha*.

5. **Scabiosa olivieri** Coult., Mém. Dipsac. 36 (1823).

Syn. *Lomelosia olivieri* (Coult.) Greuter & Burdet, Willdenowia 15: 75 (1985).

Appressed-hairy annual, 10-30 cm; stems ascending, pilose to glabrescent; leaves 2-7 x 0.2-0.4 cm, elliptic, entire, sessile; phyllaries 4-6, ovate, pilose; peduncle 4-10 cm; capitula 1-1.5 cm, slightly radiate; flowers exceeding the involucl, purple; involucl c. 1.5 mm, appressed-hairy; pits c. 0.5 mm, obovate; ribs between pits not sulcate; corona 0.5 mm, 20-24-nerved; calyx very shortly stipitate, hairy; calyx-awns 6-8 mm, exserted.

S; sandy soil. Sinai, Syria, Lebanon, Arabia, Iraq, Iran, Caucasus, Afghanistan, Pakistan, Central Asia.

6. **Scabiosa eremophila** Boiss., Diagn. Pl. Orient., ser. 1, 10: 79 (1849).

Syn. *Sixalix eremophila* (Boiss.) Greuter & Burdet, Willdenowia 15: 76 (1985).

Puberulent annual 5-15 cm; stems branched from the base, ascending; leaves 1.5-5 x 0.2-0.5 cm, narrowly oblong to linear, entire or pinnatifid; peduncle 0.5-1.5(-3) cm; flowering capitula c. 1 cm diam., not radiate; fruiting capitula  $\pm$  globose; phyllaries 6-8, longer than the flowers, linear-ovate, acute, hairy; achene enclosed by the involucl;

involucel-tube 3 mm, ovate, 8-ribbed, 8-grooved, the ribs ciliate; pits absent; corona 1-2 mm, obconical, white, hairy; calyx-awns 3; corolla purplish.

M, S; sandy plains. Libya, Egypt, Palestine.

7. **Scabiosa tenuis** Spruner in Boiss., *Diagn. Pl. Orient.*, ser. 1, 2: 114 (1843).

Slightly pubescent annual 10-50 cm; stems branched; basal leaves oblanceolate, dentate; upper leaves 2-pinnatisect, with linear lobes 0.5-1 mm wide; heads 2.5-3 cm diam.; phyllaries 0.7-1 cm, linear-lanceolate, the outer ovate, shorter than the flowers; involucel-tube 2.5-3 mm; corona 0.7-1.2 mm; calyx-awns 0.5-1.2 cm on stipe  $\pm$  as long as the corona; corolla 1.2-1.5 cm, purple.

? Dw; stony ground. Egypt, Albania, Greece.

NOTE: The occurrence of *Scabiosa tenuis* in Egypt is doubtful and might be based on an erroneous identification. The above description is mainly after Jasiewicz in Tutin *et al.*, *Flora Europaea* 4: 72 (1976), in which the species is considered endemic to Europe, being confined to Albania and Greece. It is essential to acquire authentic material from Egypt to confirm its occurrence in the country.

3. **Pterocephalus** Adans.

Annual or perennial herbs or low shrubs; leaves undivided or lyrate; capitula with long peduncles, many-flowered, often radiate; phyllaries herbaceous, in 1-2 rows; receptacle chaffy, hairy or naked; calyx short-stipitate, with 10-24 plumose bristles; corolla 5-lobed; achene enclosed by the involucel; fruiting involucel 8-ribbed; corona short-crenulate or denticulate. About 25 species, Mediterranean region to Central Asia, Himalayas, western China, tropical Africa.

- |  |                       |
|--|-----------------------|
| 1. Annual; calyx-bristles 10-12  | 2                     |
| + Low shrub; calyx-bristles 15-24  | 3                     |
| 2. Cauline leaves lyrate-pinnatisect, with few lobes, terminal lobe largest; fruiting involucel 5-6 mm                               | 1. <b>P. plumosus</b> |
| + Cauline leaves pinnatisect, with numerous $\pm$ equal lobes; fruiting involucel 3-4 mm   | 2. <b>P. brevis</b>   |
| 3. Lower leaves undivided, obovate, dentate; cauline leaves lyrate to pinnatipartite; lobes entire or obtusely dentate; corolla pink | 3. <b>P. sanctus</b>  |
| + Leaves undivided to pinnatifid; lobes narrowly triangular, acute; corolla yellow   | 4. <b>P. arabicus</b> |

1. **Pterocephalus plumosus** (L.) Coul., *Mém. Dipsac.* 31 (1823).

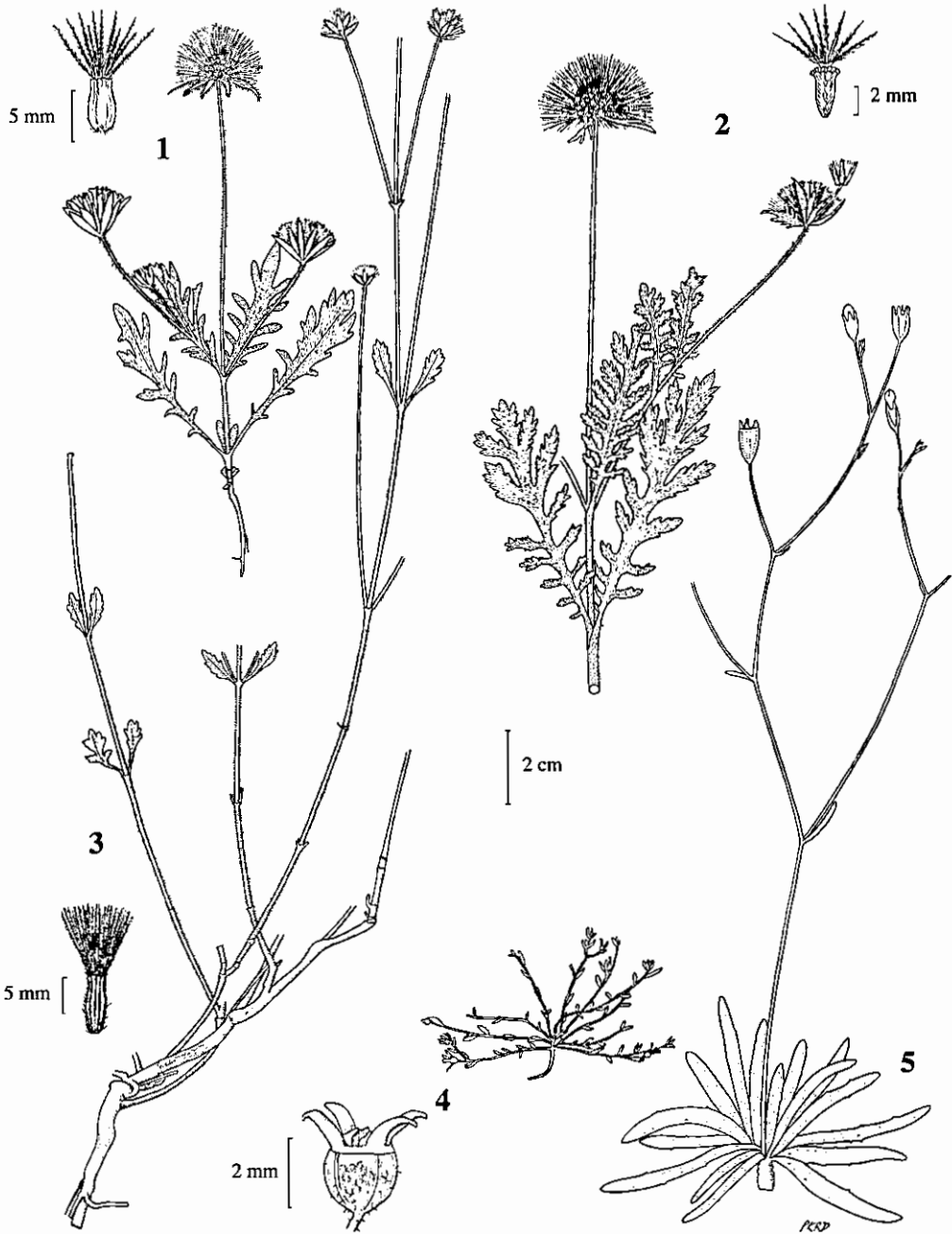
Syns. *Knautia plumosa* L., *Mant. Alt.* 197 (1771).

*Scabiosa plumosa* (L.) Sm., *Fl. Graec. Prodr.* 1: 84 (1806).

*Pterocephalus papposus* (L.) Coul., *Mém. Dipsac.* 32 (1823), nom. ambig.

*Pterocephalus caramanicus* Boiss. & Heldr. in Boiss., *Diagn. Pl. Orient.*, ser. 1, 10: 77 (1849).

Glandular-hairy annual 30-60 cm, with sparse longer eglandular hairs; stems erect, branched; lower leaves oblong-elliptic, crenate-dentate; cauline leaves lyrate-pinnatisect,



**Plate 30. DIPSACACEAE:** *Pterocephalus plumosus* 1, habit; achene enclosed by the involucre (up left). *Pterocephalus brevis* 2, flowering and fruiting branch; achene enclosed by the involucre (up right). *Pterocephalus sanctus* 3, flowering and fruiting branch; achene enclosed by the involucre (left). **CAMPANULACEAE:** *Wahlenbergia campanuloides* 4, habit; capsule (down left). *Wahlenbergia lobelioides* subsp. *riparia* 5, habit. All drawings to the same scale, except the enlarged parts (scale given). Drawn by Patricia Davies.

with few lobes, the terminal lobe largest; capitula 2-2.5 cm diam., slightly radiate; phyllaries 1-1.8 cm, in 1 row,  $\pm$  equalling the flowers, lanceolate, acute; corolla pink or pale lilac, the peripheral flowers rarely dark purple at the tip; achene enclosed by the involucrel; fruiting involucrel 5-6 mm, urceolate, pilose and glandular along the ribs, truncate and denticulate at the apex; corona absent; calyx-bristles 10-12, 0.8-1.1 cm, plumose.

M, S (Rafah, 'Oga Hafir); sandy and stony soils. Balkans, Crete, Aegean Islands, Turkey, Crimea, Georgia, Egypt, Palestine, Syria, Arabia, Iraq, Iran.

2. ***Pterocephalus brevis*** Coult., Mém. Dipsac. 32, t. 1, f. 16 (1823).

Syns. *Scabiosa involucrata* Sm. in Sibth. & Sm., Prodr. Fl. Graec. 1: 84 (1806), nom. illeg.

*Pterocephalus involucratus* (Sm.) Spreng., Syst. Veg. 1: 384 (1825).

*Pterocephalus coulteri* Boiss., Diagn. Pl. Orient., ser. 1, 10: 77 (1849), nom. illeg.

Densely glandular-hairy annual, 10-40 cm, with longer spreading eglandular hairs; stems branched; cauline leaves 2.5-6 x 0.5-2 cm, pinnatisect; lobes numerous,  $\pm$  equal, entire or divided, acute; peduncle to 18 cm; capitula 1.5-2.5 cm diam., subglobose, radiate; phyllaries 1-2.5 cm, lanceolate, acute, glandular-pilose, slightly longer than the flowers; corolla pale violet, the lobes purple at tip; achene enclosed by the involucrel; fruiting involucrel 3-4 mm, cylindrical, hairy along the ribs, truncate; corona very narrow, scarious; calyx 6-7 mm; calyx-bristles 10-12, 6-7 mm, white-plumose.

M, S; calcareous ridges. Cyprus, Karpathos, Egypt, Palestine, Lebanon, Syria, Turkey, Iraq, northwest Saudi Arabia, Iran.

3. ***Pterocephalus sanctus*** Decne., Ann Sci. Nat. Bot., sér. 2, 2: 266 (1834).

Pubescent-viscid low shrub, 15-40 cm; stems much-branched, the branches opposite, wiry; lower leaves 1-2.5 cm, undivided, obovate, dentate; cauline leaves shorter, lyrate to pinnatipartite, the terminal lobe largest; peduncle 6-12 cm, viscid; capitula 1-1.5 cm diam., slightly radiate; phyllaries 6-8 mm, oblong-elliptic, glandular-hairy; flowers 1-1.2 cm; corolla pink; achene enclosed by the involucrel; fruiting involucrel c. 4 mm, urceolate, pilose along the ribs, the apex crenate; calyx-bristles 20-24, c. 5 mm, violet-tinged.

S; stony ground. Sinai, Palestine, northwest Saudi Arabia.

NOTE: The type of *Pterocephalus sanctus* was collected in southern Sinai. The plant is browsed by sheep and goats.

4. ***Pterocephalus arabicus*** Boiss., Diagn. Pl. Orient., ser. 1, 10: 78 (1849).

Like *Pterocephalus sanctus*, but stems less branched and more densely tufted; peduncle stiff; leaves undivided to pinnatifid; lobes narrowly triangular, acute; corolla yellow.

S; stony ground. Endemic.

NOTE: The type of *Pterocephalus arabicus* was collected in Sinai.



## CAMPANULACEAE

L. Boulos

Annual or perennial herbs or low shrubs, lactiferous; leaves alternate, rarely opposite, simple, entire, dentate, incised or rarely lobed; stipules absent; inflorescence cymose, or with panicle-, raceme- or spike-like heads, or flowers solitary; flowers bisexual, regular, (3-)5(-10)-merous, mostly with a bract and 2 bracteoles; calyx adnate to the ovary; lobes usually free, persistent; petals connate or almost free; stamens 5, free or adnate to the corolla; ovary semi-inferior, rarely superior, 2-10-locular; ovules few to many, on axile placentas; fruit a capsule, dehiscent by apical or lateral valves or pores; seeds 1- to many. 87 genera, about 1950 species, cosmopolitan.

- |  |                        |
|--|------------------------|
| 1. Flowers distinctly pedicellate                                    | 2                      |
| + Flowers sessile or subsessile                                      | 3                      |
| 2. Capsule dehiscent by apical valves                                | 1. <b>Wahlenbergia</b> |
| + Capsule dehiscent by basal pores                                   | 2. <b>Campanula</b>    |
| 3. Scabrous-pubescent perennial; capsule dehiscent by 3 apical pores | 3. <b>Asyneuma</b>     |
| + Glabrous annual; capsule dehiscent by 3 apical valves              | 4. <b>Legousia</b>     |

### 1. **Wahlenbergia** Schrad. ex Roth, nom. conserv.

Literature: Thulin, M. 1975. The genus *Wahlenbergia* s. lat. (Campanulaceae) in tropical Africa and Madagascar. Symb. Bot. Upsal. 21(1): 1-223.

Annual or perennial herbs, or low shrubs; leaves alternate or rarely opposite, mostly sessile, simple, entire, dentate, rarely lobed or incised; inflorescence panicle-, raceme- or head-like, or flowers solitary; calyx-lobes (3-)5; corolla deeply (3-)5-lobed, or split almost to base, pubescent inside near the base; stamens (3-)5, free; filaments dilated or linear at the base; ovary subinferior, rarely subsuperior, 2-5-locular; ovules numerous; fruit a capsule, dehiscent by apical valves; seeds numerous; testa smooth or reticulate. About 150 species, subcosmopolitan, but especially south temperate regions, tropical Africa and Madagascar.

- |  |                            |
|--|----------------------------|
| 1. Calyx- and corolla-lobes 3-4; corolla bluish; stamens 3 | 1. <b>W. campanuloides</b> |
| + Calyx- and corolla-lobes 5; corolla white; stamens 5     | 2. <b>W. lobelioides</b>   |

### 1. **Wahlenbergia campanuloides** (Delile) Vatke, Linnæa 38: 700 (1874).

Syns. *Cervicina campanuloides* Delile, Descr. Egypte, Hist. Nat. 151 (1814).

*Wahlenbergia cervicina* A. DC., Monogr. Campan. 156 (1830).

*Campanula cervicina* (A. DC.) Dietrich, Syn. Pl. 1: 754 (1839).

*Campanopsis campanuloides* (Delile) Kuntze, Rev. Gen. Pl. 2: 378 (1891).

Hirsute annual 5-15 cm; stems branched, decumbent; leaves 3-9 x 1-1.5 mm, alternate, linear to narrowly elliptic or oblanceolate, hirsute on the lower surface; inflorescence ± monochasial, lax; pedicel 3-7 mm, hirsute; hypanthium (4-)8-nerved; calyx-lobes (3-)4 (-5), 1-3.5 mm, ± oblanceolate, denticulate; corolla 2-2.5 mm, (3-)4-lobed, bluish; tube 1.5-2 mm; stamens (3-)4; ovary 2(-3)-locular, subinferior; style c. 1.5 mm, usually

2-lobed; capsule almost spherical, 2-(-3)-locular, (4-)8-nerved; valves short; seeds 0.3-0.4 mm, elliptic, irregularly angular, sometimes narrowly winged,  $\pm$  smooth.

N; edges of cultivation. Egypt, Algeriz, Chad, Senegal, Zambia, Namibia, South Africa.

NOTE: The type of *Cervicina campanuloides* was collected in Birket el-Haggy, Egypt, Delile *s.n.* (MPU, G, P).

2. **Wahlenbergia lobelioides** (L.f.) Link, Handbuch 1: 632 (1829).

Syns. *Campanula lobelioides* L.f., Suppl. Pl. 140 (1781).

*Campanopsis lobelioides* (L.f.) Kuntze, Rev. Gen. Plant. 2: 378 (1891).

For full synonymy, see Thulin (1975).

Annual 10-50 cm; stems erect or ascending, branched from the base, hirsute; leaves 1.5-7.5 x 0.3-1.2 cm, linear to elliptic, narrowly lanceolate or oblanceolate, subacute to obtuse, hirsute to glabrescent, the margins undulate-dentate; inflorescence a lax cyme; pedicel 0.2-6 cm, glabrous; hypanthium (5-)10-nerved, obconical to obovoid; calyx-lobes 3-5, 1-4.5 mm; corolla 5-7 mm, 3-5-lobed, glabrous outside; stamens 2.4-3 mm; ovary 2-3-locular, subinferior; style 2-3-lobed, with 2-3 minute glands between the lobes; capsule 0.3-1.2 cm, 2-3-locular, (5-)10-nerved; valves 2-3, 0.6-2.2 mm; seeds 0.5 mm, ellipsoid, smooth.

Two subspecies are known from Egypt:

1. Leaves  $\pm$  flat, with a thin ciliate margin

subsp. **nutabunda**

+ Leaves undulate, with a cartilaginous margin

subsp. **riparia**

subsp. **nutabunda** (Guss.) Murb., Acta Univ. Lund, ser. 2, 19(1): 50 (1923).

Syns. *Campanula nutabunda* Guss., Pl. Rar. 94 (1826).

*Wahlenbergia etbaica* (Schweinf.) Vatke, Linnaea 38: 700 (1874).

*Laurentia etbaica* Schweinf., Nov. Sp. Aethiop., Verh. Zool.-Bot. Ges.

Wien 18: 683 (1868).

GE; sandy and rocky ground. Western Mediterranean region from Italy to Morocco, Egypt, Sudan, Ethiopia, Socotra.

subsp. **riparia** (A. DC.) Thulin, Symb. Bot. Upsal. 21(1): 94 (1975).

De; ledges of limestone cliffs (facing Beni Suef). Senegal, Guinea-Bissau, Guinea, Mali, Nigeria, Cameroon, Chad, Egypt.

NOTE: The typical subsp. *lobelioides* is restricted to Cape Verde, Madeira and Canary Islands.

## 2. **Campanula** L.

Literature: Thulin, M. 1987. Notes on *Campanula dimorphantha* (Campanulaceae). Nord. J. Bot. 7: 419-420.

Annual, biennial or perennial herbs, rarely low shrubs; leaves alternate, simple; inflorescence paniculate, racemose, spike- or head-like, or flowers solitary; calyx-lobes

5; corolla campanulate to almost rotate or cylindrical,  $\pm$  deeply 5-lobed; stamens 5, free; filaments usually dilated and ciliate at the base; ovary  $\pm$  inferior, 3-5-locular; ovules numerous; style 3-5-lobed; capsule dehiscent by basal pores; seeds numerous. About 300 species, north temperate, but especially Mediterranean region and tropical mountains.

- |   |  |
|---|--|
| 1. Perennial; corolla pinkish-white<br>+ Annual; corolla blue or yellow   | 1. <i>C. dulcis</i><br>2                         |
| 2. Corolla yellow, $\pm$ twice as long as the calyx<br>+ Corolla blue, $\pm$ equalling the calyx  | 2. <i>C. sulphurea</i><br>3                      |
| 3. Flowers subsessile; calyx-lobes triangular-lanceolate, accrescent<br>in fruit<br>+ Flowers pedicellate; calyx-lobes linear, not accrescent<br>in fruit | 3. <i>C. erinus</i><br>4. <i>C. dimorphantha</i> |

1. *Campanula dulcis* Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 258 (1834).

Spreading-hairy perennial 10-20 cm; stems branched, slender; leaves 0.3-1 x 0.2-0.4 cm, sessile, ovate, denticulate; flowers 1-4 in upper leaf-axils; peduncle 1-4 cm; pedicel recurved, hairy; calyx 3-5 x 1 mm; calyx-lobes triangular-lanceolate, acute, hairy; corolla c. 1 cm, tubular-campanulate, puberulent along the veins, pinkish-white; capsule nodding.

S; hillsides. Sinai, Palestine.

2. *Campanula sulphurea* Boiss., Diagn. Pl. Orient., ser. 1, 11: 64 (1849).

Hispid annual 10-25 cm; stems angular, simple or branched; leaves 1-3 x 0.3-0.5 cm, sessile, oblong-lanceolate, the upper smaller, linear, acute; flowers in open dichasia; peduncle 3-6 cm; pedicel 1-3 cm; calyx 1.2-1.5 cm; calyx-lobes narrowly lanceolate, ciliate; corolla  $\pm$  twice as long as the calyx, campanulate, sulphur-yellow; capsule obconical, nodding.

De, S; sandy soils. Egypt, Palestine, Lebanon, Syria.

3. *Campanula erinus* L., Sp. Pl., ed. 1, 169 (1753).

Hispid annual 5-25 cm; stems simple or branched from the base, angular; striate; leaves 0.5-1.5 x 0.3-0.8 cm, ovate-elliptic, serrate, obtuse; lower short-petiolate, the upper sessile, the uppermost lobed; flowers subsessile; calyx-lobes 3-4 mm, triangular-lanceolate, acute, accrescent and spreading-stellate in fruit; corolla  $\pm$  equalling the calyx, tubular, the lobes c. 1 mm; style included; stigmas 3; capsule c. 2.5 mm, broadly turbinate, nodding.

M, S; calcareous ground and walls. Mediterranean region, Sinai, Arabia, Iraq, Iran, Transcaucasus.

4. *Campanula dimorphantha* Schweinf., Beitr. Fl. Aethiop. 140 (1867).

Syns. *Campanula canescens* Wall. ex DC., Monogr. Campan. 292 (1830).

*Cephalostigma spathulatum* Thwaites, Enum. Plant. Zeylan. 5: 422 (1864),  
non *Campanula spatulata* Sibth. & Sm., Fl. Graec. Prodr. 1(1):

137 (1806), nec *Campanula spathulata* Waldst. & Kit., Descr.  
Iconos Plant. Rar. Hungar. 3: 286, t. 258 (1809).  
*Campanula benthamii* Wall. ex Kit., Fl. Afghanistan 377 (1960).

Pubescent annual 10-25 cm; stems single or branched from the base, erect or ascending; leaves 1.5-5 x 0.3-0.8 cm; lower spatulate, sessile; the upper lanceolate to linear-lanceolate, crenulate-dentate; flowers of two types: fertile flowers 2-3 mm, in terminal and axillary cymes, apetalous, ± closed (cleistogamous); sterile flowers c. 8 mm, solitary, less numerous and scattered along the stems, calyx-lobes 4-5 mm, linear, pubescent.

N; moist ground, Nile banks, irrigation canals. Egypt, Sudan, Ethiopia, Afghanistan, Pakistan, India, Sri Lanka, Nepal, Laos, Vietnam, China.

### 3. *Asyneuma* Griseb. & Shenk.

Literature: Damboldt, J. 1970. Revision der Gattung *Asyneuma*. Boissiera 17: 1-128, t. a, b.

Perennials; leaves simple; flowers in paniculate or racemose inflorescences, in clusters or solitary; calyx without appendages between the lobes; corolla blue, divided nearly to base into linear-lanceolate lobes connate at the base; stigmas 3; capsule cylindrical, obconical or ovoid, dehiscent by 3 apical pores. About 50 species, Mediterranean region to Caucasus and eastern Asia.

1. *Asyneuma rigidum* (Willd.) Grossh., Operd. Rast. Kavkaza 426 (1949) subsp. *sinai*  
(A. DC.) Damboldt, Boissiera 17: 105 (1970).  
Syns. *Phyteuma sinai* A. DC., Prodr. 7 (2): 455 (1839).  
*Campanula sinai* (A. DC.) Boiss., Diagn. Pl. Orient., ser. 1, 11: 76 (1849).

Scabrous-pubescent perennial 10-40 cm; leaves 2-3 x 0.6-0.8 cm, lanceolate; flowers sessile or subsessile, solitary or in distant clusters forming a lax spike; calyx-lobes 1-2.5 x 0.6-1 mm; corolla bluish; style c. 1 cm; capsule 8 x 3-4 mm, obconical, papillose, dehiscent by 3 apical pores.

S; rocky ground. Sinai, Lebanon, Syria.

NOTE: The type of *Phyteuma sinai* was collected in Gebel Musa, Sinai "ad rupes", in 1836, Aucher-Eloy 1314 (G-DC.).

### 4. *Legousia* Durande Syn. *Specularia* Heister ex A. DC.

Annuals; stems simple or branched from the base; leaves alternate, undivided; flowers solitary or in racemose or paniculate cymes, 5-merous; calyx divided to base; corolla rotate or campanulate, blue, violet or white; stamens inserted at the base of the corolla; filaments short; anthers free; ovary inferior; style included; stigmas 3, short, filiform; capsule oblong-prismatic, 3-locular, or 1-locular by abortion, dehiscent by 3 apical or median valves; seeds ovoid, flattened, glossy. 15 species, Mediterranean region.

1. *Legousia speculum-veneris* (L.) Chaix, Pl. Vap. 34 (1785).  
Syns. *Campanula speculum-veneris* L., Sp. Pl., ed. 1, 168 (1753).  
*Specularia speculum* A. DC., Monogr. Campan. 346 (1830), nom. inval.



**Plate 31. CAMPANULACEAE:** *Campanula dulcis* 1, habit; flower (right). *Campanula sulphurea* 2, habit. *Campanula erinus* 3, habit; part of the stem (right). *Campanula dimorphantha* 4, habit. *Asyneuma rigidum* subsp. *sinai* 5, habit. *Legousia speculum-veneris* 6, habit; fruit (down right). **SPHENOCLEACEAE:** *Sphenoclea zeylanica* 7, lower part with cord-like roots and flowering branch; flower (left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Patricia Davies.

Glabrous annual 15-40 cm; stems simple or branched from the base, angular; leaves 1-2 x 0.6-1 cm, undulate; lower leaves obovate, short-petiolate, the upper oblong, sessile; flowers 3-5 in terminal cymes, or solitary, subsessile; calyx-lobes 0.8-1.2 cm, linear-subulate, the margin scabrous; corolla 1-1.5 cm, rotate, violet; capsule 1-1.5 x 0.2 cm, cylindrical, constricted at the apex, dehiscing by 3 apical valves, glabrous or scabridulous; seeds 1-1.2 mm, ellipsoid.

N (Cairo region); cultivated ground. Caucasus, Central Europe, Mediterranean region, Cyprus, northern Iraq.

## SPHENOCLEACEAE

L. Boulos

Description and distribution as for *Sphenoclea*, the only genus in the family.

### 1. *Sphenoclea* Gaertn., nom. conserv.

Glabrous hygrophytic annuals; stems succulent and spongy; leaves alternate, simple, entire; stipules absent; flowers in dense spicate terminal inflorescences, regular, bisexual, subtended by a bract and 2 bracteoles; calyx-tube of 5 segments, shortly connate and adnate to the ovary, persistent; corolla 5-lobed, campanulate-urceolate, perigynous, caducous; stamens 5, inserted in the corolla-tube; filaments short; ovary semi-inferior, 2-locular; style short; stigma capitate; ovules numerous; fruit a circumscissile capsule, dehiscing by a lid; seeds numerous, minute. 2 species, pantropical.

### 1. *Sphenoclea zeylanica* Gaertn., Fruct. Sem. Pl. 1: 113, t. 24/5 (1788).

Annual 30-80 cm; roots numerous, cord-like; stems hollow, branched; leaves 2.5-10 x 0.8-2 cm, oblong-lanceolate; petiole 0.5-3 cm; flowers c. 5 mm diam., sessile, in cylindrical spikes 2.5-7.5 cm; peduncle 3-8 cm; bracts and bracteoles spatulate; calyx-lobes 1.5-2 x 1 mm, deltoid, obtuse; corolla 2.5-4 mm, white or pinkish; lobes ovate, connate to 1/2 their length; ovary 2.5 mm, obovoid; capsule 4-5 mm diam.; seeds 0.5 mm, yellowish-brown.

O (Bahariya); moist ground near springs. Tropical Africa, Madagascar, tropical Asia and America.

## COMPOSITAE

L. Boulos & D. J. N. Hind

Annuals, perennials or low shrubs, sometimes trees, rarely woody climbers, lianes, epiphytic or aquatic; tissues with latex or not; leaves alternate or opposite, usually simple, often lobed or divided; inflorescence a capitulum surrounded by an involucre of 1 or more series of protective bracts (phyllaries); capitula solitary and scapiform, in cymose or corymbiform inflorescences, or aggregated into glomerules or compound

secondary inflorescences; receptacle naked or with scales (paleae) or bristles subtending the florets; florets small, 1-500 or more, sessile on the common receptacle, perfect, pistillate, staminate or sterile; corollas gamopetalous of (3-)5 united petals,  $\pm$  regular and equally or unequally (3-)5-lobed, or variously zygomorphic, bilabiate with 2-lobed inner and 3-lobed outer lip, or pseudobilabiate with an outer 4-toothed lip and a single lobed linear inner lip, or ligulate with a strap-shaped 5-toothed limb, or radiate with strap-shaped 3- or fewer- toothed limb or ray; when all florets ligulate, capitula ligulate; when all florets regular and perfect capitulum discoid; when florets of two different rayless types (usually with outer filiform female florets and inner tubular bisexual florets), capitula disciform; when outer florets enlarged and sterile and inner florets regular and perfect, capitula radiant; when central (disc) florets regular and outer (ray) florets in one or more series radiate, capitula radiate, rarely all male or all female and the plants dioecious, or only the inner female-fertile and the outer functionally male (a heterogamous capitulum); stamens with filaments inserted on the corolla-tube; filaments usually free, rarely wholly or partially connate, often with a distinctive anther or filament collar immediately below anther; anthers usually united into a tube around the style, and dehiscing introrsely; style usually divided into 2 branches (style arms), these sometimes with apical appendages; ovary inferior, of 2 united carpels, 1-locular, with 1 erect basal ovule; fruit a 1-seeded achene, usually crowned by a persistent or deciduous pappus; pappus of awns, scales, bristles, hairs or a  $\pm$  crown-like or cup-shaped structure, or completely absent, never green or herbaceous. About 1,600 genera, 25,000 species, cosmopolitan.

- |   |                        |
|---|------------------------|
| 1. Plant with latex; all florets ligulate   | 2                      |
| + Plant without latex (except <i>Gundelia</i> ); at least central florets tubular; rays, if present, (2-)3-toothed                        | 24                     |
| 2. Leaves and phyllaries spiny; stems spiny-winged  | 76. <b>Scolymus</b>    |
| + Leaves and phyllaries not spiny; stems not spiny-winged   | 3                      |
| 3. Achenes epappose, or with a pappus of very short bristles, or a short corona   | 4                      |
| + Achenes, all or some, with well-developed pappus of hairs and bristles  | 6                      |
| 4. Leaves linear, entire; apex of achenes with recurved prickles  | 81. <b>Koelpinia</b>   |
| + Leaves pinnatipartite, dentate; apex of achenes without prickles  | 5                      |
| 5. Involucre of fruiting capitula stellately spreading  | 82. <b>Rhagadiolus</b> |
| + Involucre of fruiting capitula connivent  | 80. <b>Garhadiolus</b> |
| 6. Corollas blue, purple or pink  | 7                      |
| + Corollas yellow   | 9                      |
| 7. Leaves oblong or oblanceolate; corollas sky-blue; achenes obconical, beakless (erostrate); pappus of short lacinate scales             | 77. <b>Cichorium</b>   |
| + Leaves linear, grass-like; corollas purple or pink; achenes beaked (rostrate); pappus of bristles                                       | 8                      |
| 8. Achenes homomorphic; pappus of plumose bristles; receptacle naked  | 87. <b>Tragopogon</b>  |
| + Achenes dimorphic; marginal achenes with a pappus of scabrid bristles, the inner with plumose bristles; receptacle with filiform scales | 88. <b>Geropogon</b>   |

9. Pappus of aristate scales and barbellate bristles	10
+ Pappus of hairs and/or plumose bristles	11
10. Plant stemless; leaves in a rosette, pinnatisect; achenes straight	78. <b>Hyoseris</b>
+ Plant with distinct stems; leaves not in a rosette, oblong-oblancoolate, sinuate-dentate; achenes incurved	79. <b>Hedypnois</b>
11. Phyllaries c. 8, 1-seriate, connate at base, rather fleshy and similar	83. <b>Urospermum</b>
+ Phyllaries numerous, 2- or more-seriate, imbricate, differing in shape and size, not fleshy	12
12. Outer phyllaries 3-5, cordate or broadly ovate	85. <b>Helminthotheca</b>
+ Outer phyllaries not as above	13
13. Plant stemless; leaves all basal in a rosette	14
+ Plant with distinct stems; leaves cauline, not in a rosette	15
14. Leaves hispidulous, with multicellular hairs; pappus of outer achenes scaly, that of inner achenes plumose	84. <b>Leontodon</b>
+ Leaves glabrous or glabrescent; pappus uniform, of scabridulous hairs	98. <b>Taraxacum</b>
15. Achenes compressed or flattened	16
+ Achenes not compressed or flattened	18
16. Capitulum 80-300-flowered; involucre conical after anthesis; achenes beakless (erostrate)	95. <b>Sonchus</b>
+ Capitulum 5-25-flowered; involucre cylindrical after anthesis; achenes beaked (rostrate), beak sometimes short	17
17. Low shrub; stems spinescent; leaves decurrent; achenes attenuate to a short beak	97. <b>Scariola</b>
+ Annual or biennial herb; stems not spinescent; leaves not decurrent; achenes with distinct beak 1-4 times as long as the achene body	96. <b>Lactuca</b>
18. Plant stoloniferous; stems creeping and rooting at the nodes; roots bearing small tubers	93. <b>Aetheorhiza</b>
+ Plant not stoloniferous; stems not creeping; roots not bearing tubers	19
19. Pappus of plumose bristles	89. <b>Scorzonera</b>
+ Pappus of smooth or barbellate bristles, never plumose	20
20. Indumentum of glochidiate branched bristles	86. <b>Picris</b>
+ Indumentum of simple, not glochidiate hairs, or plant glabrous	21
21. Peduncle ebracteate; outer phyllaries much shorter than the inner, and forming a calyculus	22
+ Peduncle bracteate; bracts usually merging with the outer phyllaries	23



22. Achenes dimorphic, the marginal not beaked, the inner distinctly divided into main body and beak, ribs on achene body conspicuously and transversely squamose-muricate especially towards the apex, beak long, filiform, deciduous **94. Heteroderis**  
+ Achenes homo- or heteromorphic, beakless and truncate, or attenuate to a beak, ribs on achene body not transversely squamose-muricate, beak, if present, thick, persistent **92. Crepis**
23. Pappus setae homomorphic, connate at the base into a ring **91. Reichardia**  
+ Pappus setae homomorphic or dimorphic, not connate at the base **90. Launaea**
24. Florets in unisexual capitula; staminate many-flowered, in terminal inflorescences; pistillate 1-2-flowered below the male capitula, with connate phyllaries enclosing the florets **25**  
+ Florets all bisexual, or bisexual and unisexual in the same capitulum **26**
25. Fruiting involucre with hooked prickles; phyllaries of staminate capitula free **50. Xanthium**  
+ Fruiting involucre sparsely hairy, with a few median horn-like processes; phyllaries of staminate capitula connate **51. Ambrosia**
26. Plant with latex; capitula 4-8 cm diam., composed of numerous disseminules; each disseminule contains 6 aggregated 1-flowered capitula of which only 1 is fertile, producing a single achene; disseminule with a denticulate pappus-like crown **1. Gundelia**  
+ Plant without latex; capitula simple, or compound with 1- to few-flowered capitula; pappus absent or of short bristles **27**
27. Capitula compound (synflorescence), of numerous 1- to few-flowered capitula **28**  
+ Capitula simple, few- or many-flowered **29**
28. Stems winged; leaves decurrent, not spiny; capitula few-flowered; pappus absent **29. Sphaeranthus**  
+ Stems not winged; leaves not decurrent, spiny; capitula 1-flowered; pappus of short bristles **2. Echinops**
29. Leaves and/or bracts spiny, rarely spinulose **30**  
+ Leaves and bracts not spiny or spinulose, during or after anthesis **47**
30. Both leaves and phyllaries spiny or spinulose **31**  
+ Either leaves or phyllaries spiny or spinulose **42**
31. Achenes hairy or woolly **32**  
+ Achenes glabrous **33**
32. Inner phyllaries conspicuously enlarged, scarious, coloured, radiate, longer than the florets **3. Carlina**  
+ Inner phyllaries not as above, shorter than the florets **6. Atractylis**
33. Hilum lateral **34**  
+ Hilum basal **36**

34. Pappus 2-seriate, outer of 10 long and inner of 10 shorter bristles + Pappus not as above	17. <b>Cnicus</b> 35
35. Pappus of plumose or scabrid bristles + Pappus of scales	16. <b>Carduncellus</b> 15. <b>Carthamus</b>
36. Phyllaries spine-tipped or prickly + Phyllaries not spine-tipped or prickly	37 42
37. Phyllaries tapering into a scabrid spine + Phyllaries not as above	18. <b>Dicoma</b> 38
38. Stems with spinose wings + Stems without spinose wings	39 40
39. Pappus of plumose bristles + Pappus of scabrous, not plumose bristles	9. <b>Onopordum</b> 4. <b>Carduus</b>
40. Pappus of all achenes barbellate + Pappus, at least of inner achenes, plumose	8. <b>Silybum</b> 41
41. Perennial; receptacle fleshy; corollas white or purplish; all pappus-setae plumose + Annual; receptacle not fleshy; corollas purple; pappus of marginal achenes scabridulous, not plumose	7. <b>Cynara</b> 5. <b>Notobasis</b>
42. Outer phyllaries pectinate-fimbriate, ending in a long red awn; achenes with concentric furrows at the apex + Outer phyllaries not pectinate; achenes without furrows at the apex	10. <b>Zoegea</b> 43
43. Achenes dimorphic, the marginal epappose with a basal hilum, the inner pappose with a lateral hilum; hilum carunculate + Achenes homomorphic	14. <b>Mantisalca</b> 44
44. Pappus of multiseriate scales, the outer narrow, the inner longer, broader and finely serrate at the apex + Pappus not as above	13. <b>Volutaria</b> 45
45. Pappus of multiseriate rigid barbellate bristles + Pappus dimorphic; the inner 1-seriate, of short equal scales; the outer multiseriate, of longer bristles	43. <b>Iphiona</b> 46
46. Florets 7-15; corollas purple; pappus deep purple; hilum $\pm$ linear + Florets more than 15; corollas yellow or pink; pappus not purple; hilum not linear	11. <b>Crupina</b> 12. <b>Centaurea</b>
47. Phyllaries with distinctive dark glands, connate, forming a tubular sheath around the achenes + Phyllaries not fused to form a tubular sheath around the achenes and lacking glands	57. <b>Tagetes</b> 48

48. Plant stemless; capitula congested into dense glomerules, appressed to the ground and overtopped by a rosette of oblong-lanceolate leaves **32. *Gymnarrhena***  
+ Plant with distinct stems; capitula not crowded or appressed to the ground or overtopped by leaves 49
49. Leaves pinnately lobed; pappus retrorsely-barbed **55. *Bidens***  
+ Leaves simple, sometimes deeply dissected but not lobed; pappus not retrorsely-barbed 50
50. Stems winged 51  
+ Stems not winged 52
51. Phyllaries 2-3-seriate, spine-tipped, glandular **47. *Geigeria***  
+ Phyllaries 5-6-seriate, not spine-tipped, pubescent **25. *Pseudoconyza***
52. Ray florets absent 53  
+ Ray florets present 82
53. Capitula small 54  
+ Capitula conspicuous 60
54. Phyllaries bright yellow or white throughout, scarious, persistent **38. *Helichrysum***  
+ Phyllaries not as above 55
55. Pappus of plumose setae with relatively very long side hairs **33. *Lasiopogon***  
+ Pappus-setae smooth, barbellate or shortly plumose at the apex 56
56. Phyllaries entirely scarious 57  
+ Phyllaries herbaceous or the margin scarious 59
57. Capitula in dense terminal clusters surrounded by a rosette of leaves; phyllaries acute to acuminate; achene epidermis smooth; bisexual florets funnel-shaped **35. *Homognaphalium***  
+ Capitula in lax terminal corymbs not surrounded by leaves or of few together, sometimes surrounded by a whorl of leaves; phyllaries obtuse to subacute; achene epidermis of imbricate papillae; bisexual florets tubular 58
58. Inflorescence of loose terminal flat-topped corymbs; corollas yellow; achene hairs myxogenic; stereome divided; pappus setae connate at base, with long patent cilia **36. *Pseudognaphalium***  
+ Inflorescence of few capitula together, sometimes surrounded by a whorl of leaves; corollas purple (at least at apex or base); achene hairs not myxogenic; stereome undivided or with thin streaks; pappus setae free at base, barbellate **37. *Gnaphalium***
59. Pappus-bristles plumose at the apex **30. *Ifloga***  
+ Pappus-bristles, if present, scabrous or barbellate, not plumose **31. *Filago***
60. Outer phyllaries connate at the base, ending in leaf-like appendages; inner phyllaries spinescent with age **46. *Anvillea***  
+ Phyllaries not as above 61

61. Achenes epappose or with a membranous crown or auricle	62
+ Achenes with pappus of hairs or bristles	76
62. Pappus a membranous crown or auricle	63
+ Pappus not a crown or auricle	66
63. Leaves linear-oblongate, often 3-dentate at the apex	66. <b>Chlamyphora</b>
+ Leaves finely dissected	64
64. Plant villous, acaulescent; branches prostrate; achenes 1.8-2.25 mm	61. <b>Anacyclus</b>
+ Plant glabrous; stems erect; achenes 1-1.5 mm	65
65. Capitula radiate or disciform; peduncle 1-3 cm; achenes 1 mm, distinctly 5-ribbed; pappus absent or of a membranous corona	65. <b>Matricaria</b>
+ Capitula discoid; peduncle to 12 cm; achenes 1.5 mm, slightly incurved, with thin furrows; pappus of a membranous auricle, longer than the achene	64. <b>Tripleurospermum</b>
66. Corollas purple, violet or blue	67
+ Corollas yellow	68
67. Leaves alternate; pappus absent	19. <b>Ethulia</b>
+ Leaves opposite; pappus of few free scales	20. <b>Ageratum</b>
68. Annual	69
+ Perennial	73
69. Leaves undivided, pinnatifid or coarsely crenate or lobed in the upper part, not deeply dissected	70
+ Leaves deeply dissected	71
70. Stems erect, stiff, thinly pilose; leaves obovate-oblongate, undivided or coarsely crenate or lobed, narrowly auriculate at the base; capitula campanulate, erect, on short stiff peduncles	22. <b>Ceruana</b>
+ Stems ascending or procumbent, tomentose; leaves lyrate-pinnatifid, sessile; capitula subglobose, nodding, on thin peduncles	21. <b>Grangea</b>
71. Plant acaulescent, with prostrate branches; receptacle paleate	61. <b>Anacyclus</b>
+ Plant erect or ascending; receptacle naked	72
72. Plant glabrous	65. <b>Matricaria</b>
+ Plant sparsely or densely villous	70. <b>Cotula</b>
73. Plant white-woolly; leaves entire to crenulate; heads 7-9 mm diam.; upper part of the achene enclosed by the decurrent auricles of the corolla-tube (coastal sands)	63. <b>Otanthus</b>
+ Plant not as above	74
74. Capitula 3-5 mm diam., in corymbs; receptacle paleate	62. <b>Achillea</b>
+ Capitula smaller, in panicles; receptacle glabrous or hairy	75

75. Phyllaries 4-7-seriate; florets 2-4, all bisexual;  
apical anther-appendages linear or narrowly lanceolate 72. **Seriphidium**  
+ Phyllaries 2-seriate; florets more than 10; ray florets, if present, pistillate;  
apical anther-appendages subulate 71. **Artemisia**
76. Shrub 1-3 m; leaves to 3.5 cm broad, oblong-elliptic; corollas purplish 24. **Pluchea**  
+ Annual or perennial; leaves narrower; corollas yellow, pale pink or white 77
77. Capitula solitary; outer phyllaries ovate 34. **Phagnalon**  
+ Capitula not solitary; outer phyllaries not ovate 78
78. Pappus heteromorphous, the outer of bristle-like short scales,  
the inner of long plumose bristles 42. **Pegolettia**  
+ Pappus homomorphous, scabrous or fine 1-seriate bristles, or of a short  
denticulate crown 79
79. Leaves pinnatisect into 10-15 pairs of short pinnatifid lobes;  
pappus of a short denticulate corona 69. **Tanacetum**  
+ Leaves entire, sparsely dentate, serrate, incised or 3-5-lobed at the apex;  
pappus of barbellate or fine bristles, 1-seriate 80
80. Stems  $\pm$  glabrous; corollas yellow; anthers tailed; achenes 0.75 mm 26. **Doellia**  
+ Stems hairy or glandular-hairy; corollas purple-tipped, yellowish,  
pale pink or white; anthers rounded at the base; achenes 1-1.8 mm 81
81. Capitula heterogamous; outer florets pistillate, numerous, multiseriate; central  
florets few, bisexual but sometimes partly functionally staminate 27. **Conyza**  
+ Capitula homogamous; all florets bisexual, fertile 44. **Chiliadenus**
82. Pappus absent or of a membranous crown or auricle, or a few minute bristles 83  
+ Pappus of hairs, bristles, scales or awns 93
83. Perennial 84  
+ Annual 86
84. Pappus of short denticulate corona 69. **Tanacetum**  
+ Pappus absent 85
85. Plant strongly aromatic; capitula numerous in dense compound corymbs,  
on peduncles 1-4 mm, not nodding at maturity; receptacle paleate;  
achenes 1-1.5 mm, strongly compressed, narrowed at the base,  
broader and truncate at the tip, not winged 62. **Achillea**  
+ Plant not aromatic; capitula few in lax corymbose racemes,  
on peduncles 5-8 cm, nodding at maturity; receptacle naked;  
achenes 0.8-1 cm, with broad membranous wings 75. **Osteospermum**
86. Plant covered with appressed short rigid hairs; leaves opposite,  
oblong-elliptic or -lanceolate, entire or dentate; corollas white with  
a few minute bristles (wet places) 52. **Eclipta**  
+ Plant not covered with appressed short rigid hairs; leaves alternate;  
corollas variously coloured, not white 87

87. Leaves not dissected	88
+ Leaves dissected	89
88. Capitula small, in congested scorpioid terminal cymes, irregularly rayed; rays short; corollas yellow; achenes all cylindrical, black	58. <b>Flaveria</b>
+ Capitula conspicuous, solitary, conspicuously and regularly rayed; corollas orange-yellow; achenes polymorphic, incurved, brown	74. <b>Calendula</b>
89. Marginal achenes sharply triquetrous, angles narrowly-winged; inner achenes with 1 broad wing; pappus absent	68. <b>Glebionis</b>
+ Achenes not winged; pappus of a membranous crown, an auricle, or absent	90
90. Receptacle epaleate	65. <b>Matricaria</b>
+ Receptacle paleaceous, paleae deciduous	91
91. Disc florets with yellow corollas drying blackish-red; achenes embedded in dense wooly rather compact hairs	67. <b>Lasiospermum</b>
+ Disc florets with yellow corollas; achenes glabrous	92
92. Base of the corolla of disc florets obliquely saccate, forming a long lanceolate spur covering the achene on one side	60. <b>Chamaemelum</b>
+ Base of the corolla of disc florets swollen in fruit	59. <b>Anthemis</b>
93. Ray florets with lilac or violet-blue corollas	94
+ Ray florets with white or yellow corollas	95
94. Low shrub or perennial with woody base, 10-25 cm; corollas of ray florets lilac; disk florets with yellow corollas (Gebel Elba)	23. <b>Felicia</b>
+ Annual or biennial 0.5-1.2 m; all florets with violet-blue corollas (weed of cultivated and waste ground)	28. <b>Symphotrichum</b>
95. Ray limbs white	96
+ Ray limbs yellow	97
96. Pappus of a cupule from which arise 2-3 unequal barbellate awns	53. <b>Blainvillea</b>
+ Pappus of scales connate at the base, awnless	54. <b>Galinsoga</b>
97. Leaves narrowly linear	39. <b>Leysera</b>
+ Leaves of different shapes, not narrowly linear	98
98. Pappus of irregularly dentate scales	99
+ Pappus not as above	100
99. Paleae glandular; achenes lacking secretary cavities	48. <b>Asteriscus</b>
+ Paleae pubescent; achenes with secretary cavities	49. <b>Nauplius</b>
100. Pappus of 2 filiform awn-like bristles	56. <b>Verbesina</b>
+ Pappus of numerous bristles or scales	101

101. Pappus of an outer cupule of short connate scales and inner  
much longer barbellate bristles 45. **Pulicaria**  
+ Pappus of outer and inner series of bristles 102
102. Phyllaries 1-seriate, with a basal calyculus; anthers not appendiculate  
at the base; pappus of silky scabridulous hairs, usually deciduous 73. **Senecio**  
+ Phyllaries multiseriate; anthers with ciliate basal appendages;  
pappus of bristles 103
103. Pappus of 30-50 bristles, free to the base;  
achenes not contracted at the apex 40. **Limbarda**  
+ Pappus bristles 20-25, connate at the base forming a brownish cupule;  
achenes abruptly constricted at the apex into a short neck 41. **Dittrichia**

### 1. **Gundelia** L.

Literature: Karis, P. O., Eldenäs, P. & Källersjö, M. 2001. New evidence for the systematic position of *Gundelia* L. with notes on delimitation of Arctoteae (Asteraceae). *Taxon* 50: 105-114.

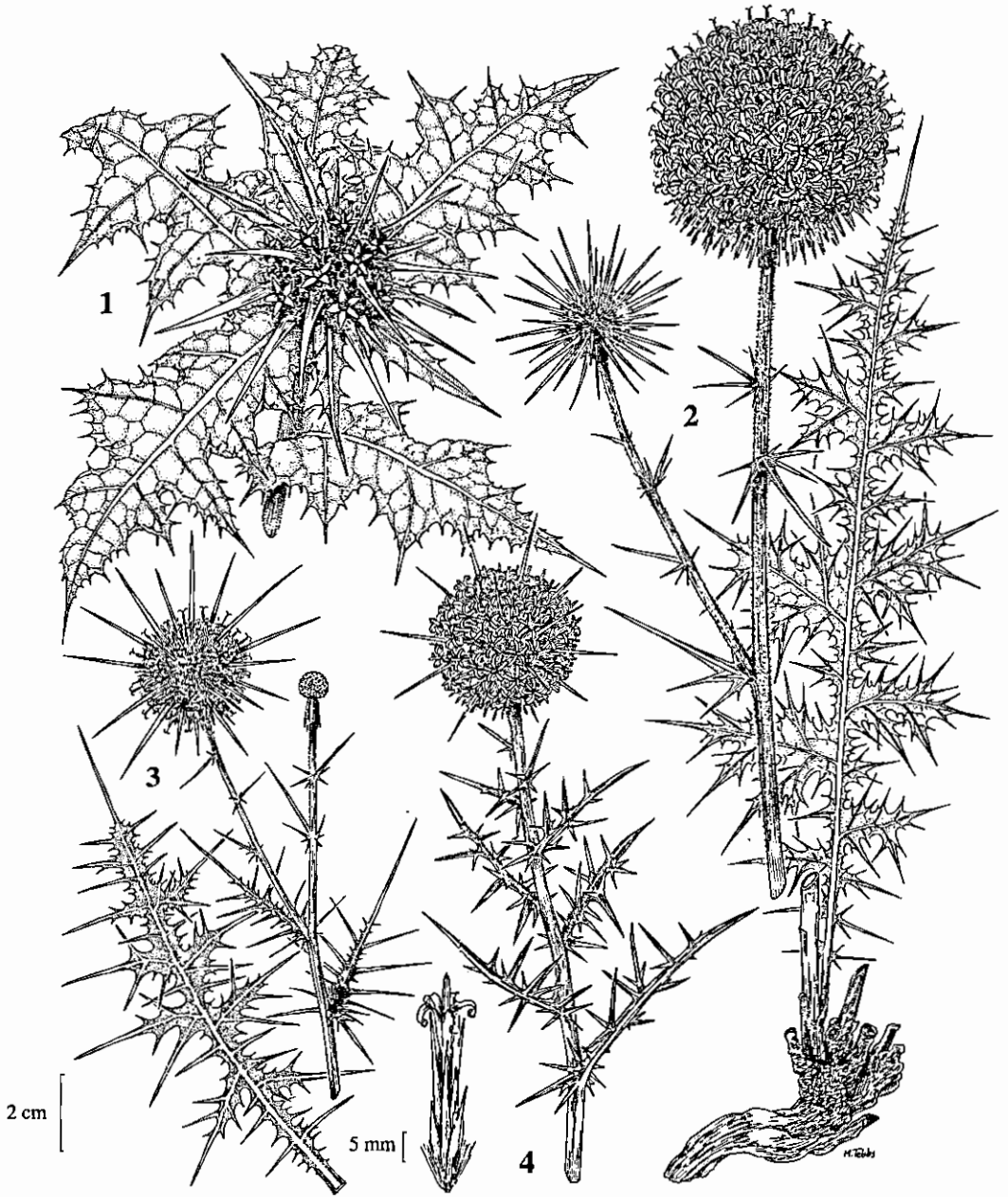
Spiny perennials; latex present; leaves alternate, pinnatifid to pinnatisect, strongly spiny-dentate; inflorescence composed of large tertiary capitula, each with numerous disseminules; each disseminule subtended by a spiny bract and corresponding to 6 aggregated 1-flowered capitula, of which the central contains a bisexual floret, the 5 peripheral sterile capitula having functionally male florets; florets tubular; phyllaries of several series of bracts, fused with the receptacular bracts of individual headlets into a spiny-margined turbinate cupule; cupule woody at maturity, enclosing a single achene and dispersed as a 1-seeded unit; pappus of a denticulate crown. 2 species, northern Sinai, Palestine, Lebanon, Syria, Cyprus, Turkey, Transcaucasus, northern Iraq, northern Iran, Afghanistan.

#### 1. **Gundelia tournefortii** L., *Sp. Pl.*, ed. 1, 814 (1753).

Spiny perennial 30-60 cm, glabrescent or slightly arachnoid; latex present; stems branched; leaves 6-25 x 4-14 cm, rigid, leathery, with prominent veins, pinnatifid to pinnatisect; lobes spiny-dentate; lower leaves tapering at the base; upper leaves smaller, sessile or decurrent at the base into spiny stem-wings; inflorescence of tertiary capitula, 4-8 cm diam., with c. 30 disseminules; each disseminule subtended by a spiny-margined bract and contains 6 clustered 1-flowered capitula, of which the central contains a bisexual floret; the 5 peripheral capitula sterile, with functionally male florets; florets tubular; involucre fused with the receptacular bracts of individual headlets into a spiny-margined turbinate cupule; cupule woody at maturity, enclosing a single achene and dispersed as a 1-seeded disseminule; achene 5.5-6 x 2.5-3 mm, ovoid, smooth; disseminule with a denticulate pappus-like crown.

S, (El-Arish to Rafah); sandy plains. Northern Sinai, Palestine, Lebanon, Syria, Cyprus, Turkey, Transcaucasus, northern Iran.

NOTE: The systematic position of the genus *Gundelia* is rather peculiar: although it is laticiferous, a character of Lactuceae, it has tubular florets, a character of Cardueae. Karis *et al.*, (2001) investigated the systematic position of *Gundelia* by using sequences from the chloroplast gene *ndhF* which indicates strong support for placing *Gundelia*



**Plate 32. COMPOSITAE:** *Gundelia tournefortii* 1, flowering branch. *Echinops glaberrimus* 2, flowering branch and basal woody part with a leaf. *Echinops hussonii* 3, flowering branch; basal leaf (left). *Echinops spinosus* 4, flowering branch; capitulum (down left). All drawings to the same scale, except the enlarged part (scale given). Drawn by Margaret Tebbs.



within the tribe Lactuceae, together with *Scolymus*, *Tragopogon*, *Cichorium* and *Lactuca*, rather than with the tribe Arctoteae. According to Kupicha in Davis, Fl. Turkey 5: 326 (1975), the species is a tumbleweed, dried in summer for winter fodder. A chewing-gum is made from the latex and the seeds are used as a coffee substitute. Feinbrun-Dothan, Fl. Palaest. 3: 361 (1978) notes: "achenes edible, young capitula eaten as an artichoke, the white latex causes nausea."

## 2. *Echinops* L.

Spiny perennial herbs; leaves undivided to 3-pinnatisect, spiny; synflorescence terminal and axillary, compound, of numerous 1-flowered capitula congested into a globose synflorescence on a swollen common receptacle; each capitulum subtended by small, often concealed bracts and falling apart at maturity; capitula with an involucre consisting of an outer series of white bristles or narrow scales and an inner series of rigid, imbricate, free or partly fused phyllaries; florets tubular, bisexual; corolla yellow, white or blue, the lobes 5, linear; achenes elongate, often densely appressed-pilose; pappus crown-like, persistent, of short connate or free bristles or scales; the unit of dispersal is the deciduous, 1-seeded capitula. About 120 species, Mediterranean region to Central Asia, tropical African mountains.

- |   |                            |   |
|---|----------------------------|---|
| 1. Flowering synflorescence 1.7-2.5 cm diam. excluding the spines                         | 5. <i>E. taeckholmiana</i> | 2 |
| + Flowering synflorescence 3-6.5 cm diam. excluding the spines                            |                            |   |
| 2. Cauline leaves ± glabrous on both surfaces; spines bright lemon-yellow                 | 1. <i>E. glaberrimus</i>   |   |
| + Cauline leaves white-woolly at least on the lower surface; spines straw-yellow to cream |                            | 3 |
| 3. Leaf-lobes broadly triangular, with flat margin  |                            | 4 |
| + Leaf-lobes narrow, with revolute margin   |                            | 5 |
| 4. Stems glabrous; capitula with horn-like spines   | 2. <i>E. hussonii</i>      |   |
| + Stems glandular-hairy; capitula without horn-like spines                                | 3. <i>E. macrochaetus</i>  |   |
| 5. Stems greyish, cobwebby, not or slightly glandular-hairy                               | 4. <i>E. spinosus</i>      |   |
| + Stems dark red, not cobwebby, densely glandular-hairy                                   | 6. <i>E. galalensis</i>    |   |

1. *Echinops glaberrimus* DC. in Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 260 (1834).

Perennial 30-60 cm; stems several from the base, unbranched, striate, glabrous, pale red, bearing 1 synflorescence; cauline leaves to 20 cm, pinnatisect, the basal ± glabrous on both surfaces, the upper short-glandular; nerves elevated on the lower surface; lobes pinnatifid, spiny, the terminal spine longest; spines bright lemon-yellow; young synflorescences golden-yellow; mature synflorescences 5-6.5 cm diam.; phyllaries glabrous; bristles 8 mm, fine, white; corolla white.

De, S; stony ground, especially on granite. Egypt, Palestine, northwest Saudi Arabia.

2. *Echinops hussonii* Boiss., Diagn. Pl. Orient., ser. 1, 10: 86 (1849).

Perennial to 1.5 m; stems branched, bearing more than 1 synflorescence, glabrous, becoming slightly glandular below the synflorescence; golden-yellow, drying metallic

reddish-brown, striate; leaves to 40 x 15 cm, sessile, much-divided, cobwebby-lanate with elevated glossy veins on the lower surface, the veins on the upper surface white-lanate; lobes broadly triangular, the margins spiny; synflorescences 3-4 cm diam., with horn-like yellow spines; bristles c. 8 mm, fine, white; corollas pale blue.

De, R, GE; sandy and stony ground. Egypt, Sudan, Saudi Arabia.

3. **Echinops macrochaetus** Fresen., Mus. Senckenb. 3: 69 (1845).

Erect perennial 30-80 cm; stems branched, often dark red, glandular-hairy above; leaves 6-18 x 3-6 cm, oblanceolate to elliptic, pinnatifid, glandular-puberulous on the upper surface, densely white-tomentose beneath, the base semi-amplexicaul; lobes broadly triangular, incised or dentate, the teeth and apex tapering to a spine; synflorescences 3-4 cm diam.; corollas blue, achenes densely setulose; pappus of staccous ciliate scales, connate at the base.

S; stony ground. Sinai, Arabia, Ethiopia, Sudan.

4. **Echinops spinosus** L., Mant. 119 (1767).

Syns. *Echinops spinosus* Sm. in Sibth. & Sm., Fl. Graec. Prodr. 2: 209 (1813) pro parte.

*Echinops viscosus* DC., Prodr. 6: 525 (1838), non Schrad. ex Rchb. (1836).

*Echinops creticus* Boiss. & Heldr. in Boiss., Diagn. Pl. Orient., ser. 1, 10: 87 (1849).

Perennial 30-80 cm; stems usually branched, bearing more than 1 synflorescence, greyish, striate, not or slightly glandular-hairy; leaves to 25 x 12 cm, sessile, greenish with arachnoid indumentum on the upper surface, white-tomentose beneath, 2-3-pinnatisect; lobes spinose, the margins revolute; leaf-base amplexicaul; synflorescences 4-5 cm diam.; capitula 3-5 cm; phyllaries 1.5-3.5 cm, including the spine, multiseriate, puberulent; corollas whitish-blue; achene c. 4 x 1.5 mm, oblong; pappus 1 mm, of a corona of fused bristles.

M, D, R, S; sandy and rocky ground. Mediterranean region, Sinai.

NOTE: Täckholm (1974), pp. 529-532. cited *Echinops spinosus* L. as a synonym of *E. spinosissimus*. According to Kozuharov in Tutin *et al.* (1976), pp. 212-213, both are good species and he separated them by the following characters: *Echinops spinosus* has leaves with arachnoid indumentum on the upper surface and phyllaries pubescent, while in *E. spinosissimus* the leaves have simple glandular hairs on the upper surface, and the phyllaries glabrous. Meikle (1985), p. 940, stated that the Cyprus material of *E. spinosissimus* approaches Egyptian *E. spinosus* in leaf-shape, habit, etc. Although *Echinops spinosus* is the only species of the two known from Egypt, further studies are needed to better understand this difficult group.

5. **Echinops taekholmiana** Amin, Candollea 42: 411 (1987).

Decumbent whitish-green perennial, to 35 cm; stems striate, white-tomentose especially in the upper parts; leaves 3-8 cm, pinnatisect; lobes narrowly linear, the margins revolute, spiny; synflorescences 1.7-2.5 cm diam.; phyllaries c. 12, the outer 5-6 mm, the middle row c. 1 cm, the inner c. 5 mm; corolla whitish-cream; achenes not seen.

N (northwest delta), sandy soil. Endemic.

NOTE: The type of *Echinops taeckholmiana* was collected in El-Gediya, northwest of the Nile delta, 15 July 1977, Amal Amin s.n. (CAI, holotype; K, isotype).

6. ***Echinops galalensis*** Schweinf. in Asch. & Schweinf., Mém. Inst. Egypt. 2, Suppl. 748 (1889).

Robust perennial 50-80 cm; stems dark red, densely glandular-hairy; leaves to 20 x 8 cm, pinnatisect; lobes narrow, almost awl-shaped, greyish white-lanate on the lower surface, mixed with dark brown glandular-hairs mainly on the midvein and along the margin of the upper surface; synflorescences 4.5-5.5 cm diam., with numerous yellow spines to 4 cm, shortly stipitate; outer bristles about twice as long as the outer phyllaries.

M, De, R, S; stony and sandy soils. Libya, Egypt.

NOTE: The type of *Echinops galalensis* was collected in the Galala mountains, Eastern Desert, Egypt.

### 3. ***Carlina*** L.

Annual, biennial or perennial spiny herbs or low shrubs; stems sometimes very short or plant stemless; leaves toothed, lobed or pinnatisect; capitula homogamous, discoid; phyllaries polymorphic, the outer foliaceous, pinnatifid to pinnatisect, spinose; the median herbaceous, linear to narrowly oblong, the inner conspicuously enlarged and exceeding the florets, scarios, variously coloured and radiating when dry; receptacle flat, covered with receptacular bracts, split above into numerous fusiform bristles; corolla tubular, yellow, 5-lobed; filaments free; achenes terete, truncate; hilum basal; pappus 1-2-seriate of plumose-laciniate scales. About 28 species, Macaronesia, Mediterranean region, western Asia.

1. ***Carlina involucrata*** Poir., Voy. Barbarie 2: 234 (1789).

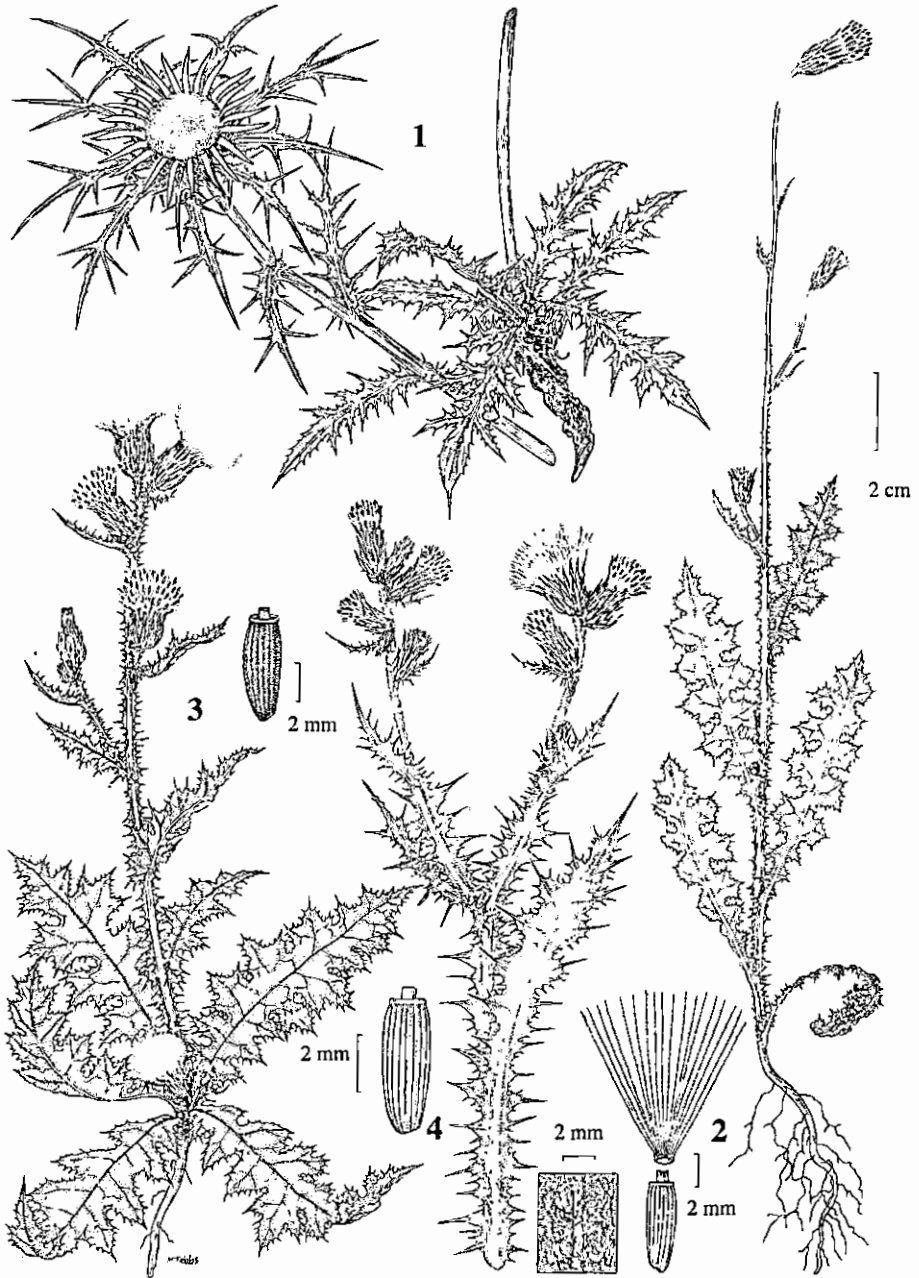
Perennial 15-60 cm, woody at the base; stems simple or branched, glabrous; basal and cauline leaves 5-18 x 2-6 cm, pinnatisect; lobes narrow, spinose; uppermost leaves forming a conspicuous spiny ruff to 12 cm diam. below the capitulum; capitula solitary or few; outer phyllaries foliaceous, spinose, the inner 1.8-2 cm, pectinate-spinose; innermost 1.5-2 x 0.2-0.4 cm, oblong-linear, acuminate, golden-yellow, ligule-like; corolla 7-8 mm, yellow, narrowly tubular, 5-lobed; achenes c. 3 mm, narrowly fusiform, densely appressed-hairy; pappus plumose.

M; stony ground. North Africa.

### 4. ***Carduus*** L.

Literature: Kazmi, S. M. A. 1964. Revision der Gattung *Carduus* (Compositae), II. Mitt. Bot. München 5: 279-550.

Annual, biennial or perennial herbs; stems commonly winged and spiny; leaves lobed or pinnatisect; cauline leaves decurrent, forming spiny wings; capitula homogamous, discoid; phyllaries imbricate, spine-tipped; receptacle densely setose; florets bisexual;



**Plate 33. COMPOSITAE:** *Carlina involucreta* 1, flowering branch and basal part. *Carduus argentatus* 2, habit; achene and detached pappus (down left). *Carduus getulus* 3, habit; achene (up right). *Carduus pycnocephalus* 4, flowering and fruiting branch; achene (down left); close-up of cobwebby leaf underside (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

corollas tubular, purple, pink or white; filaments pilose; achenes oblong-ovoid, glabrous, glossy, hilum basal; pappus of scabrous multiseriate hairs, connate at the base, deciduous. About 91 species, Europe, Mediterranean region, Asia, East African mountains.

- 1. Stems winged below the elongated wingless peduncles;  
capitula solitary 1. **C. argentatus**
- + Stems winged throughout their length; capitula in clusters,  
sessile or short-pedunculate 2
- 2. Plant glabrescent or arachnoid-hairy; achenes 3.5-4 x 1.5 mm,  
longitudinally rugose 2. **C. getulus**
- + Plant densely cobwebby; achenes 4-5 x 2 mm, with 16 longitudinal  
furrows, glabrous 3. **C. pycnocephalus**

1. **Carduus argentatus** L., Mant. Alt. 280 (1771).

Annual 20-50 cm; stems branched or unbranched, winged below the elongated wingless peduncles, the wings spiny-lobed; leaves 5-20 x 1-8 cm, greenish on the upper surface, white-tomentose beneath, pinnatifid; lobes dentate, spinulose; lower leaves petiolate; cauline leaves decurrent; capitula solitary, 1.2-1.8 cm, oblong, on long wingless peduncles; phyllaries 0.2-1.5 x 0.2-0.3 cm, imbricate, multiseriate, narrowly lanceolate, partly or entirely scarious, the apex ending in a yellow spinule; florets ± equalling the involucre, purple; achenes 4.5-6 x 2 mm; pappus 1-1.2 cm, of numerous scabrous brownish bristles.

De; sandy and stony desert wadis. East Mediterranean region, eastwards to Iraq, Pakistan and Afghanistan.

NOTE: The type of *Carduus argentatus* was collected in Egypt, 966/10 (LINN).

2. **Carduus getulus** Pomel, Nouv. Mat. Fl. Atlant. 2: 275 (1875).

Annual 10-30 cm, glabrescent or arachnoid-hairy; stems branched, spiny-winged; leaves lobed, spiny; capitula in terminal clusters of 2-5, broadly campanulate, sessile or short-pedunculate; phyllaries cobwebby to glabrescent, narrowly triangular-lanceolate, scarious-margined, with an elevated midvein in the upper part, ending in a spinule; florets 1-1.2 cm; corolla pinkish; achenes 3.5-4 x 1.5 mm, compressed, longitudinally rugose; pappus 1-1.2 cm, of scabrous, greyish-white bristles.

M, S; waste ground, sandy desert. North Africa, Sinai, Palestine, Saudi Arabia.

3. **Carduus pycnocephalus** L., Sp. Pl., ed. 2, 1151 (1763).

Annual 15-60(-80) cm, densely cobwebby; stems usually branched, broadly winged, with irregular deltoid spiny lobes; leaves 5-15 x 2-6 cm, greyish-tomentose on the lower surface, with spinose lobes; capitula in terminal or lateral clusters, sessile or short-pedunculate, 1.5-2 x 0.8-1.2 cm, ovoid-oblong; phyllaries 5-6-seriate, imbricate, 0.4-2 cm, lanceolate-subulate; outer 3-nerved, inner 1-nerved, the margins scarious, ciliate; corollas 1.4-1.8 cm, tubular; achene 4-5 x 2 mm, compressed, with 16 longitudinal furrows, glabrous; pappus 1.1-1.4 cm, of numerous scabrous greyish-brownish bristles in several series.

Several subspecies are known, of which two occur in Egypt:

subsp. **pycnocephalus**

Median phyllaries strongly 1-nerved in their distal  $1/2-3/4$ , not purplish distally.

N, M, De, S; roadsides, waste ground, fallow fields.

subsp. **arabicus** (Jacq. ex Murray) Nyman, Consp. Fl. Europ. 414 (1879).

Syns. *Carduus australis* L.f., Suppl. Pl. 348 (1781).

*Carduus arabicus* Jacq. ex Murray, Syst. Veg. 714 (1784).

*Carduus marmoratus* Boiss. & Heldr. in Boiss., Diagn. Fl. Orient., ser. 2, 3: 43 (1856).

*Carduus pseudosyriacus* Løjac, Natural. Sicil. 4: 109 (1885).

*Carduus arabicus* Jacq. ex Murray subsp. *marmoratus* (Boiss. & Heldr.) Kazmi, Mitt. Bot. München 5: 450 (1964).

*Carduus pycnocephalus* L. subsp. *breviphyllaris* P. H. Davis, Notes Roy. Bot. Gard. Edinb. 33: 412 (1975).

Median phyllaries nerved in their distal  $1/6-1/2$ , usually purplish distally.

N, M, De, S; roadsides, waste ground, fallow fields.

Area of the species: East Mediterranean region, Sinai, eastwards to Pakistan and Afghanistan.

NOTE: The differences between the two subspecies are difficult to determine, and intermediate variants occur. However, subsp. *arabicus* is treated as a distinct species: *Carduus arabicus*, both in Täckholm, Stud. Fl. Egypt, ed. 2, 534 (1974) and in Feinbrun-Dothan, Fl. Palaest. 3: 376 (1978). In Boulos, Checklist Fl. Egypt 146 (1999) it appears under *Carduus australis*. Davis in Davis *et al.*, Fl. Turkey 5: 435 (1975) treats this taxon as a subspecies: *Carduus pycnocephalus* subsp. *arabicus*, a concept which is adopted here.

## 5. **Notobasis** (Cass.) Cass.

Spiny annuals; leaves alternate; capitula disciform; phyllaries imbricate, ending in a spinule; receptacle bristly; florets tubular; corolla pink or purple; achenes compressed, smooth; hilum basal, slit-like; pappus multiseriate, the inner bristles plumose, connate at the base and deciduous. 1 species, Canary Islands, Madeira, Portugal, southern Spain, Corsica, southern Italy, Greece, Cyprus, North Africa, Palestine, Syria, Turkey, Transcaucasus, Armenia, northern Iraq, Iran, Azerbaijan, Eritrea.

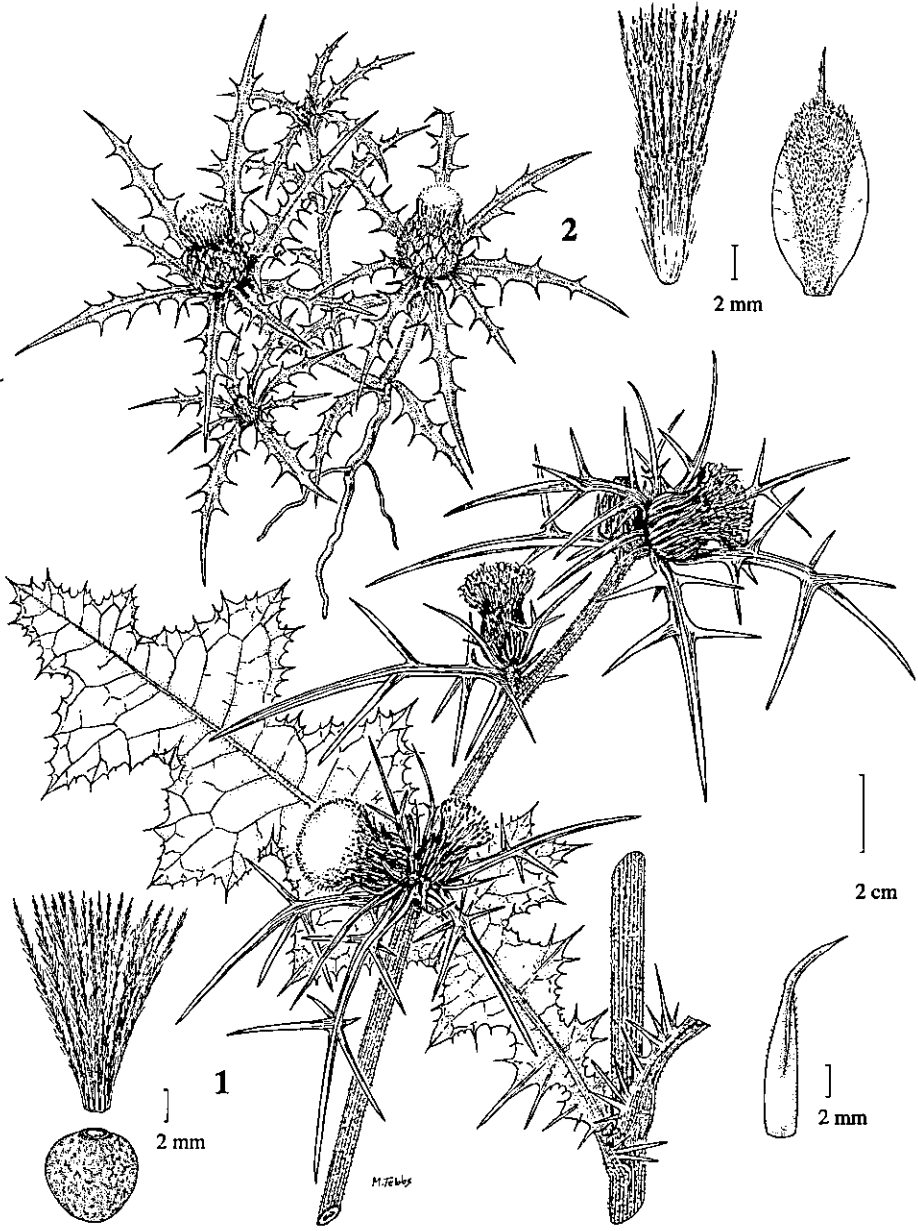
1. **Notobasis syriaca** (L.) Cass., Dict. Sci. Nat. 35: 171 (1825).

Syns. *Carduus syriacus* L., Sp. Pl., ed. 1, 823 (1753).

*Cirsium syriacum* (L.) Gaertn., Fruct. Sem. Pl. 2: 283, t. 163, f. 2 (1791).

*Cnicus syriacus* Roth in Usteri, Neue Ann. Bot. 3 (8): 10 (1794).

Spiny annual 25-80 cm, sparsely arachnoid; stems striate, branched above; leaves to 25 x 8 cm, glabrous or thinly arachnoid, pinnatifid, the lobes ending in rigid spines; basal leaves petiolate, the cauline auriculate, clasping; uppermost purplish, reduced to



**Plate 34.** COMPOSITAE: *Notobasis syriaca* 1, flowering and leafy branches; phyllary (right); achene and detached pappus (left). *Atractylis carduus* 2, habit; achene and inner phyllary (up right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

pinnatisect spines and surrounding the capitula; capitula c. 3 x 2 cm, terminal and lateral, sessile or short-pedunculate; phyllaries 0.5-1.8 x 0.2-0.3 cm, imbricate, narrowly lanceolate, spreading above, sparsely cobwebby; corollas pink or purple, exceeding the involucre; achenes 5-6 x 3-4 mm, broadly obovoid, compressed, smooth, brown; pappus 1.5 cm, white, silky, outer hairs scabridulous.

N, M, De; waste ground, fallow fields. Distribution as for the genus (mainly after Dittrich *et al.* in Rechinger, ed., 1979. Compositae 3, Cynarae, Fl. Iranica 139a: 285-286, and Mesfin Tadesse (personal communication) for the Eritrea record).

## 6. *Atractylis* L.

Spiny annuals or perennials, or low shrubs; leaves dentate to pinnatisect, spinose; capitula mostly homogamous and discoid or radiant; phyllaries multiseriate, the outer leaf-like, spiny-dentate; receptacle with rigid scales split into long bristles; florets bisexual, tubular, or the marginal female and radiant; corollas purple, pink or yellow; achenes terete, silky, devoid of an elevated rim at the apex; hilum basal; pappus 1-3-seriate of plumose bristles. About 30 species, Canary Islands, Mediterranean region, Asia.

- |  |                            |
|--|----------------------------|
| 1. Outer phyllaries pectinate-pinnatisect  | 2                          |
| + Outer phyllaries similar to cauline leaves   | 3                          |
| 2. Lateral spines on the pectinate phyllaries numerous, rigid, branched above, simple at the base; all florets tubular, not radiate; corollas purplish-pink  | 3. <i>A. cancellata</i>    |
| + Lateral spines on the pectinate phyllaries few, thin, remote, not or very slightly branched; marginal florets radiate; corollas pink                       | 2. <i>A. prolifera</i>     |
| 3. Outer phyllaries to 4 times as long as the capitulum; capitula radiant; corollas pale yellow  | 1. <i>A. carduus</i>       |
| + Outer phyllaries to twice as long as the capitulum; capitula discoid; corollas pink or flesh-coloured  | 4                          |
| 4. Plant densely cobwebby  | 5                          |
| + Plant glabrous or cobwebby towards the apex  | 6                          |
| 5. Annual; capitula broadly cup-shaped   | 4. <i>A. boulosii</i>      |
| + Biennial or short-lived perennial; capitula cylindrical  | 5. <i>A. aristata</i>      |
| 6. Perennial, woody at the base; cauline leaves 4-10-lobed, spines along the margins often 2-3-fid, yellowish; inner phyllaries abruptly ending in a spinule | 7. <i>A. serratuloides</i> |
| + Annual; cauline leaves remotely 1-2-lobed; spines along the margins saffron-yellow to orange; inner phyllaries tapering into an orange spinule             | 6. <i>A. mernepthae</i>    |

1. *Atractylis carduus* (Forssk.) C. Chr., Dansk Bot. Ark. 4, 3: 27 (1922).  
 Syns. *Centaurea carduus* Forssk., Fl. Aegypt.-Arab. 152 (1775).  
*Atractylis flava* Desf., Fl. Atlant. 2: 254 (1799).  
*Atractylis citrina* Coss. & Kralik, Bull. Soc. Bot. France 4: 361 (1857).



Spiny perennial 15-50 cm, cobwebby to glabrescent; stems procumbent to ascending, branched or simple, or plant  $\pm$  stemless; leaves 2-6 x 0.4-1 cm, coriaceous, linear-lanceolate to oblong-elliptic, sinuate-dentate or pinnatifid, the margins and tip spiny; capitula solitary, ovoid, radiate; outer phyllaries to 4 times as long as the capitulum, similar to the cauline leaves; inner phyllaries ovate to oblong-ovate, cobwebby, the tip spiny; corollas pale yellow; ligules few, longer than the disc florets; achenes 6-8 mm, silky; pappus 1-1.5 cm, of plumose bristles connate at the base.

Five varieties occur in Egypt:

var. **carduus**

Leaves and outer involucre leathery, cobwebby.

M, D, GE, S; calcareous and sandy soil.

var. **latifolia** Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 24, f. 4a (1974).

Leaves to 2.5 x 1 cm.

M, Dw; calcareous and sandy soil.

var. **angustifolia** Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 24, f. 46 (1974).

Leaves to 6 x 0.5 cm.

D, S; calcareous and sandy soil.

var. **marmorica** Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 24, f. 5a (1974).

Plant stemless or very short-stemmed.

M, Dw; calcareous and sandy soil. Endemic.

var. **glabrescens** (Boiss.) Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 24 (1974).

Syns. *Atractylis flava* Desf. var. *glabrescens* Boiss., Fl. Orient. 3: 452 (1875).

*Atractylis flava* Desf. var. *citrina* (Coss. & Kralik) Muschl., Man. Fl. Egypt 1024 (1912), nom. superfl.

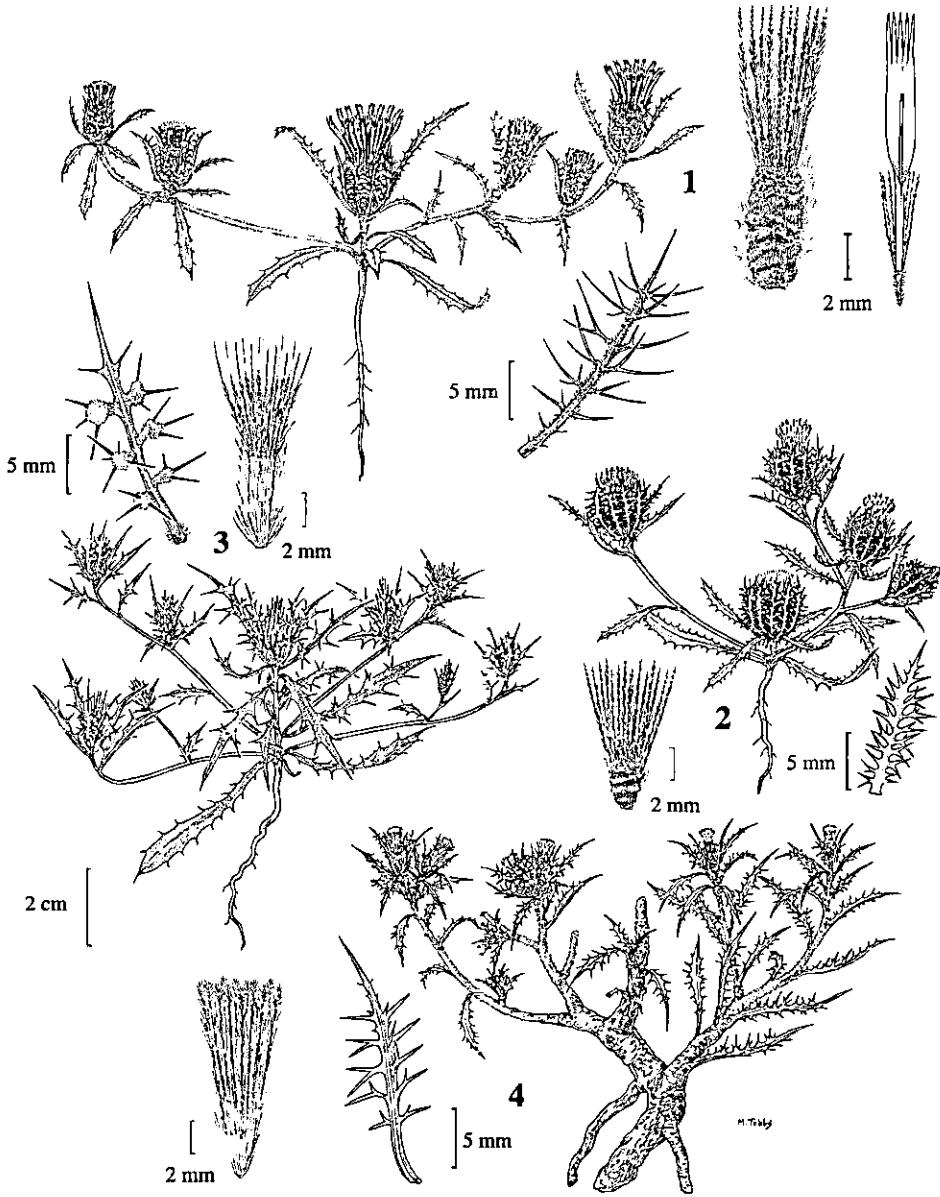
*Atractylis flava* Desf. var. *glabrescens* (Boiss.) Feinbr. in Feinbr. & Gruenberg-Fertig, Israel J. Bot. 25: 83 (1976).

Plant sparsely tomentose to almost glabrous.

M, De, S; calcareous and sandy soil.

Area of the species: North Africa, Sinai, Palestine, eastwards to Baluchistan.

NOTE: The type of *Centaurea carduus* was collected in Alexandria, Egypt, in 1762, Forsskål 1070 (C).



**Plate 35. COMPOSITAE:** habit of *Atractylis prolifera* 1; achene and floret (up right); phyllary (down right). *Atractylis cancellata* 2; phyllary (down right); achene (down left). *Atractylis mernepthae* 3; achene and phyllary (up). *Atractylis serratuloides* 4; phyllary and achene (left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

imbricate, unequal, scarious-margined, lanceolate, acute; receptacle flat, paleaceous; florets 7-15; corollas pink, red or purple, 5-lobed; anthers short-appendiculate at the base; achenes subcylindrical, truncate above; hilum lateral or basal; outer pappus setae of multiseriate scales and rigid barbellate bristles; inner pappus 1-seriate, of short scales. 3 species, Mediterranean region, southwest Asia to China.

1. ***Crupina crupinastrum*** (Moris) Vis., Fl. Dalm. 2: 42, t. 51, f. 3 (1847).

Syn. *Centaurea crupinastrum* Moris, Enum. Sem. Hort. Taur. 1842: 12 (1842).

Annual 25-60 cm, pubescent below, scabridulous above; stems branched above, deeply sulcate, leafy mainly in the lower part; lowermost leaves not lobed, soon withering; cauline leaves 4-10 x 1-3.5 cm, pinnatisect into serrate-dentate lobes, the margins with stipitate glands; lower leaves petiolate, the upper sessile, clasping; capitula on peduncles to 6 cm; florets 9-15; phyllaries multiseriate, 0.25-2.2 x 0.2-0.4 cm, the inner progressively longer, lanceolate, mucronate, purple especially at the centre and tip; corollas c. 2 cm, purple; achenes 3-3.5 x 2.5 mm, cylindrical-turbinate, apex truncate, appressed-silky; hilum lateral, ± linear, white; pappus 6-7 mm, deep purple, inner scales denticulate at the apex.

M; cultivated ground. Mediterranean region, extending to Caucasus, eastwards to Iran.

12. ***Centaurea*** L.

Syns. *Melanoloma* Cass., *Aegialophila* Boiss. & Heldr., *Tomanthea* DC.,  
*Phaeopappus* Boiss., *Cheirolepis* Boiss., *Plectocephalus* D. Don,  
*Hyalea* (DC.) Jaub. & Spach, *Grossheimia* Sosn. & Takht., *Aethlopappus* Cass.,  
*Chartolepis* Cass., *Palaeocyanus* Dostál, *Wagenitzia* Dostál

Annual, biennial and perennial herbs or low shrubs, sometimes acaulescent; leaves alternate, sometimes in a rosette, usually pinnatifid to pinnatisect, not spiny; capitula heterogamous; marginal florets often enlarged and radiant; phyllaries multiseriate, scarious or papyraceous, sometimes indurate, with a terminal appendage of different shapes or a spine; receptacle densely setose; marginal florets often enlarged and sterile, the central bisexual; corollas tubular or infundibuliform, 4-8-lobed, pink, blue, yellow or white, filaments free; anthers with a sagittate base; style-branches erect or spreading; receptacle bristly; achenes oblong, mostly glabrous, slightly compressed, the apex truncate; hilum lateral; pappus present or absent, persistent or caducous, multiseriate, of unequal scabridulous, barbellate or plumose bristles, the innermost often scale-like, persistent or rarely deciduous, rarely absent. About 500 species, Mediterranean region, Europe, Asia, tropical Africa, America, Australia.

- |  |                          |
|--|--------------------------|
| 1. Phyllaries pectinately white-fimbriate  | 2                        |
| + Phyllaries not pectinately white-fimbriate   | 3                        |
| 2. Perennial; capitula 4-5 cm diam.; median rows of phyllaries terminated by a rigid spine 1-3.5 cm  | 1. <i>C. eryngioides</i> |
| + Annual; capitula 1-1.2 cm diam.; phyllaries terminated by a spinule 2-5 mm   | 2. <i>C. ammocyanus</i>  |
| 3. Phyllaries scarious-margined, with a terminal spine 2-6 mm; achenes densely silky-hairy; pappus of a persistent crown of scarious scales and inner caducous setae connate at the base | 4                        |
| + Phyllaries and pappus not as above; achenes not silky-hairy  | 5                        |

M, S; calcareous ground. Egypt, southern Palestine.

NOTE: Syntypes of *Onopordum alexandrinum* were collected in Alexandria, Egypt, and Gaza, Palestine.

## 2. *Onopordum ambiguum* Fresen., Mus. Senckenb. 1: 85 (1834).

Densely white-cobwebby biennial or short-lived perennial, 30-60 cm; stems erect, winged, the wings slightly lobed, with yellow spines; basal leaves 8-20 x 3-6 cm, broadly elliptic, shallowly lobed, the margins spiny; cauline leaves smaller, scarcely lobed, spiny; capitula subglobose, single, on long winged peduncles; involucre 2-2.5 x 3-4.5 cm (excluding the spines), broadly ovoid; outer phyllaries c. 8 x 6 mm, ovate and cobwebby at the base, narrowed to a glabrous spine to 3.5 cm, the spines spreading or reflexed; middle and inner phyllaries with spines 3-4 cm; corollas c. 3 cm, the corolla-tube c. 1.5 cm; achenes 4-5 x 1.5 mm, 4-angled, slightly compressed; pappus 1.8-2 cm, of plumose bristles connate at the base.

De, S; granite and sandstone hillsides. Egypt, Palestine, Saudi Arabia.

NOTE: The type of *Onopordum ambiguum* was collected in Sinai, May 1831, Ruppell (K, holotype, photo!).

## 10. *Zoegea* L.

Delicate annuals; leaves narrow, unarmed; capitula heterogamous, radiate; involucre ovoid or subglobose; phyllaries scarious, the outer and median with a pectinate-fimbriate appendage, the inner longer, ± entire, often coloured at the apex; receptacle covered with dense bristles; corollas golden-yellow, pink or white; marginal florets enlarged, neuter, 4-fid; inner florets tubular, bisexual, 5-fid; filaments glabrous; achenes compressed, obovate, with concentric apical furrows; hilum lateral; pappus 2-seriate, rigid, persistent; outer pappus of short scales; middle pappus of multiseriate bristles; inner pappus 1-seriate, of short hyaline scales. 3 species, Egypt, southwest to Central Asia.

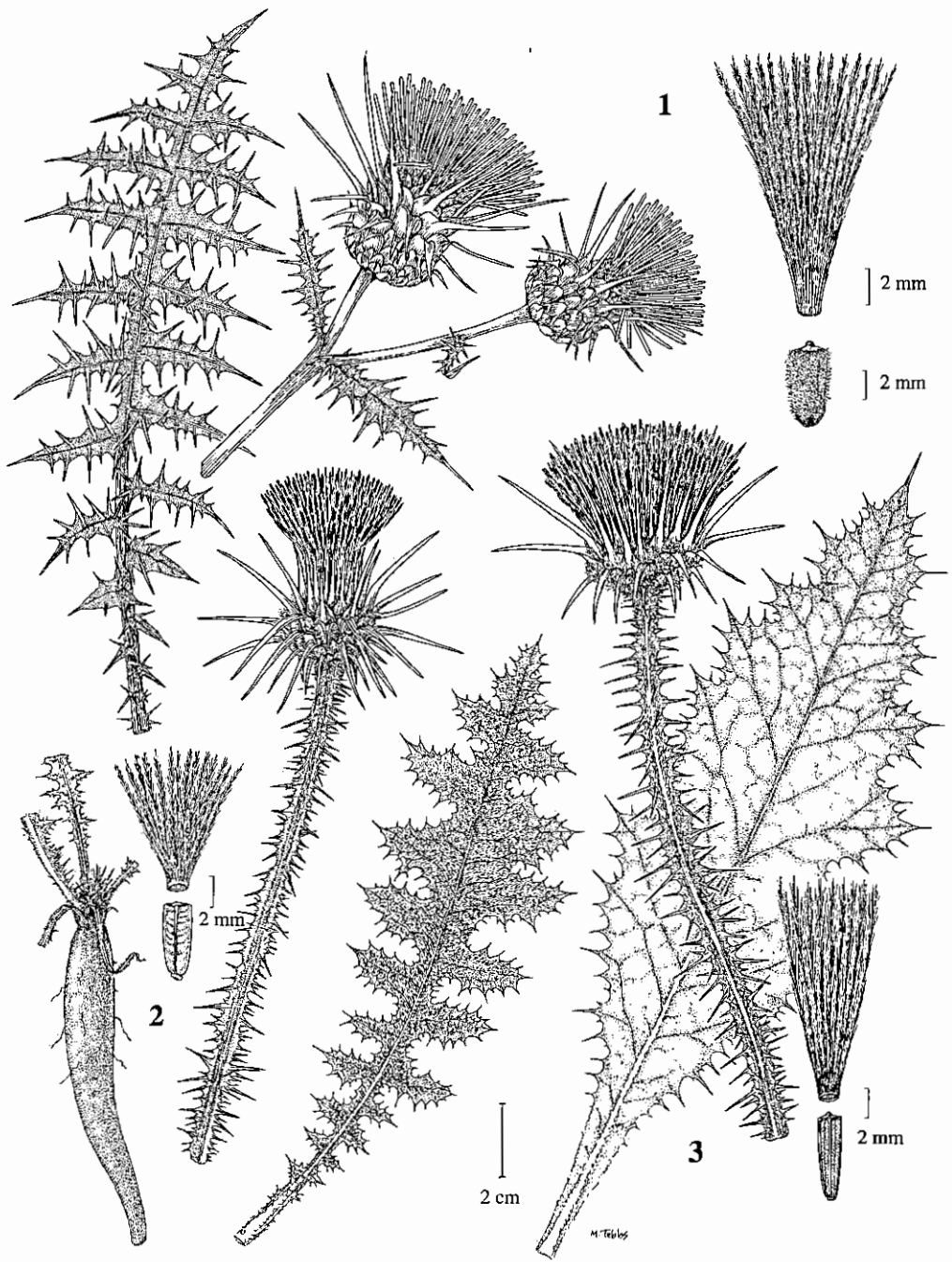
### 1. *Zoegea purpurea* Fresen., Mus. Senckenb. 1: 86, t. 5 (1834).

Delicate green scabridulous annual, 10-40 cm; stems branched, 4-angled, sulcate; basal leaves few, petiolate, not lobed or pinnatisect, soon withering; cauline leaves 1-3 x 0.1-0.2 cm, linear, entire; capitula c. 1 cm, subglobose, on slender peduncles to 6 cm; phyllaries ± glabrous, with purple tips; outer pectinate-fimbriate, ending in a long fine awn, the median longer, denticulate below the awn, the inner muticous; corollas white or pink, ± equalling the involucre; marginal florets 5 mm, the inner 7 mm; achenes 2 mm, with concentric furrows at the apex, glabrous, glossy; pappus 7-8 mm, of scales and bristles.

De, S; stony ground. Egypt, Palestine, Lebanon, Syria, Arabia, Iraq, Iran.

## 11. *Crupina* (Pers.) DC.

Canescent-tomentose to ± glabrous annuals; leaves alternate, pinnatifid to pinnatisect, unarmed, with stipitate glands on the margins; capitula heterogamous, radiant; florets 3-15, the marginal pistillate but sterile, the inner bisexual; phyllaries multiseriate,



**Plate 37. COMPOSITAE:** flowering branches of: *Cynara cornigera* 1; cauline leaf (left); achene and detached pappus (right). *Onopordum alexandrinum* 2; cauline leaf (right); achene and detached pappus, and basal part (left). *Onopordum ambiguum* 3; basal leaf, achene and detached pappus. All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbis.

oblong base 1-1.5 x 0.8-1 cm, the apex pectinate-spinose, with a spine 3-7 cm; corollas purple or white; corolla-tube c. 2 cm, slender; corolla-lobes 6-7 mm; filaments glandular-papillose, connate into a tube c. 1.5 cm; anthers c. 6 mm, linear, with an acute apical appendage; style c. 3 cm, branches united almost to the apex; achenes 6-7 x 3 mm, oblong compressed; pappus 1.2-1.5 cm, of rigid white barbellate bristles, connate at the base, deciduous.

Two varieties occur in Egypt:

var. **marianum**

Corollas purple.

N, O, M, S; canal banks, roadsides, waste ground.

var. **albiflorum** Eig, Second Contr. Fl. Palest., Bull. Inst. Agr. Nat. Hist. Tel Aviv 6: 44 (1927).

Corollas white.

N, O, M, S; canal banks, roadsides, waste ground.

Area of the species: Mediterranean region, Sinai, eastwards to Afghanistan, naturalized elsewhere.

## 9. **Onopordum** L.

Spinose cobwebby biennial or perennial herbs; stems with spinose wings; leaves almost entire, or pinnatifid to pinnatisect, decurrent, spinose, the basal often in a rosette; inflorescence branched or capitula solitary, large; phyllaries leathery, imbricate, entire, erect or recurved; florets homogamous, bisexual; corollas purple; corolla-tube slender, deeply 5-lobed; filaments pilose; anthers sagittate; style-branches short; receptacle fleshy, flat, not paleate; achenes smooth or rugulose, compressed or 4-angled, the apex truncate; hilum basal; pappus multiseriate, of scabridulous, barbellate or plumose bristles connate at the base, deciduous. About 60 species, Canary Islands, Europe, Mediterranean region, western Asia.

1. Plant to 1.2 m, green or slightly cobwebby;

middle cauline leaves pinnatisect

1. **O. alexandrinum**

+ Plant to 60 cm, densely white-cobwebby;

middle cauline leaves scarcely lobed

2. **O. ambiguum**

1. **Onopordum alexandrinum** Boiss., Diagn. Pl. Orient., ser. 1, 10: 93 (1849).

Biennial or short-lived perennial, 0.4-1.2 m, green or cobwebby; stems branched from the base, winged, the wings all along the stems, of triangular connected lobes, long-spiny; leaves lobed, the middle cauline pinnatisect, the uppermost oblong; capitula on long peduncles, slightly cobwebby; involucre 3-4.5 cm diam.; outer phyllaries oblong-lanceolate at the base, abruptly terminated by an acuminate spreading or reflexed spine; middle phyllaries  $\pm$  as long as the florets, the inner shorter; corollas 2-2.5 cm, purple; achenes 5-6 mm, oblong, 4-angled; pappus 1-1.2 cm, of plumose bristles connate at the base, yellowish, deciduous.

## 7. *Cynara* L.

Perennial herbs; leaves large, with spinose lobes, or unarmed; capitula large, homogamous, discoid, solitary or in lax terminal corymbs; phyllaries multiseriate, imbricate, coriaceous, often terminating in a spine; corollas narrowly tubular, purple, blue or whitish; ray limb unequally 5-lobed, glandular; anthers with blunt apical appendages and sagittate bases; style exserted; receptacle flattish, fleshy, foveolate; achenes oblong-ovoid, compressed, 4-angled, glabrous; hilum basal; pappus of multiseriate plumose deciduous setae, connate at the base. 8 species, Macaronesian Islands, Mediterranean region.

### 1. *Cynara cornigera* Lindl. in Sibth. & Sm., Fl. Graec. 9: 25 (1837).

Syn. *Cynara sibthorpiana* Boiss. & Heldr. in Boiss., Diagn. Pl. Orient., ser. 1, 10: 94 (1849), nom. superfl. et illeg.

Dwarf perennial 15-50 cm; stems unbranched or slightly branched, sulcate; leaves to 50 x 20 cm, mostly basal, pinnatisect, coriaceous, glabrescent and variegated on the upper surface, white-tomentose beneath; lobes oblong, acute, coarsely spinose-dentate; petiole with fringes of small spines; uppermost leaves sessile; capitula solitary or 2-3 in lax corymbs; involucre 3.5-5 cm diam.; phyllaries imbricate, 5-8-seriate, glabrous, the outer 0.5-1 x 0.4-0.8 cm, broadly oblong, shortly spinose; inner progressively larger, 1-2 x 0.7-1.4 cm, with a terminal spine 1.5-4 cm; corollas 3-6 cm, magnolia-white or pale yellow; anthers 0.65-1.1 cm; styles 3-5.5 cm; style branches 0.6-1.1 cm; achenes c. 6 x 3.5 mm, oblong, laterally compressed, smooth, yellowish-brown; pappus 1.5-1.8 cm, 4-6-seriate, plumose, ± free to base, rigid, white.

M; fields and calcareous roadsides. Libya (Cyrenaica), Egypt, Cyprus, Crete, Aegean Islands.

NOTE: The plant is edible as an artichoke.

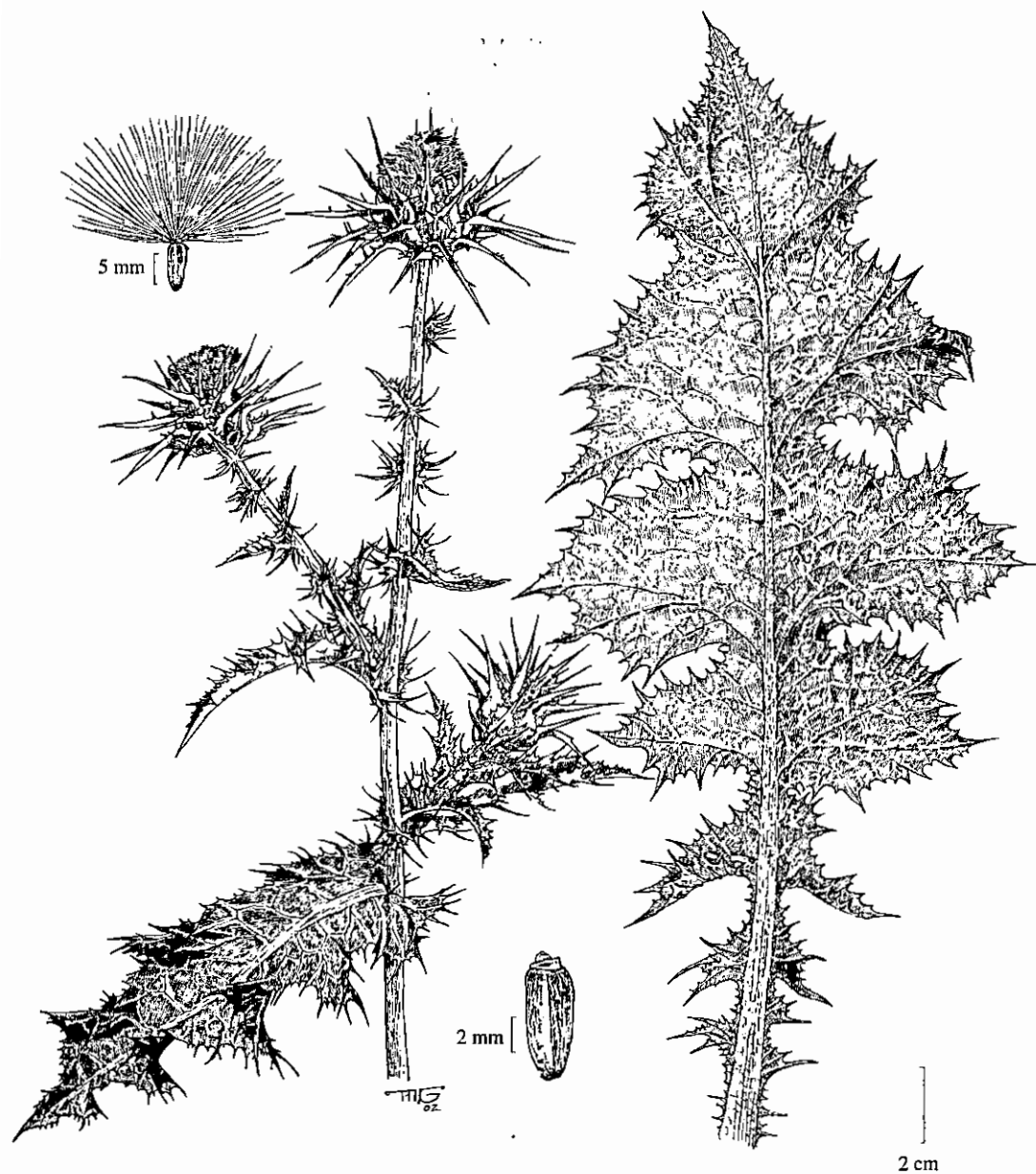
## 8. *Silybum* Adans., nom. conserv.

Spinose annuals or biennials; stems robust, simple or branched; leaves variegated or white-veined, alternate, lobed or pinnatisect, the margins spinose; basal leaves in a rosette, the cauline decurrent; capitula solitary, large, homogamous, discoid; phyllaries multiseriate, imbricate, coriaceous, the apex spinulose; corollas purple or white, corolla-tube slender, ray limb 5-lobed; filaments glandular-papillose, partly united; anthers with an acute apical appendages, the base shortly sagittate; style exserted; style-branches united almost to apex; receptacle flat, fleshy, setose; achenes narrowly oblong-obovoid, slightly compressed, glabrous; hilum narrow, sub-basal; pappus of barbellate multiseriate bristles, connate at the base, deciduous. 2 species, Mediterranean region, eastwards to Afghanistan.

### 1. *Silybum marianum* (L.) Gaertn., Fruct. Sem. Pl. 2: 378 (1791).

Syn. *Carduus marianus* L., Sp. Pl., ed. 1, 823 (1753).

Glabrous biennial 0.4-1.5 m; stems erect, usually unbranched, sulcate; leaves to 50 x 25 cm, oblanceolate, sinuate-lobed, white-blotched, the margins spinose; basal leaves large, in a rosette; the cauline smaller, sessile, shortly decurrent, with spinose basal auricles; inflorescence branched; capitula solitary; phyllaries imbricate, glabrous, with a broadly



**Plate 36.** COMPOSITAE: *Silybum marianum*, flowering branch and basal leaf; achene with pappus (up left); achene without pappus (down). Drawings to the same scale, except the achenes (scale given). Drawn by Magdy El-Gohary.



obconical, very densely white-woolly; pappus 7-8 mm, 1-seriate, of plumose bristles, connate at the base, deciduous.

S; mountain crevices, hillsides. Algeria, Niger, Chad, Sinai.

NOTE: *Atractylis aristata*, described from the Algerian Sahara, based on two collections around 1900, was recollected from Chad in 1966, and from Niger in 1970 and 1979. We have seen the specimens collected from Chad and Niger (K!), but not the type from Algeria, nor any material from Egypt. The above description is based on the Chad and Niger specimens, and seems to match the original description of Battandier (1902). Collections from Egypt are therefore most desirable to learn more about its identity, since its occurrence in Sinai represents a discontinuity in the geographical distribution, known otherwise from the Algerian Sahara, Niger and Chad. Moreover, its occurrence in Egypt might have been based on erroneous records, as it could possibly have been confused with the closely allied *Atractylis mernepthae* and *A. serratuloides* which are also known from Sinai and the Eastern Desert of Egypt.

6. *Atractylis mernepthae* Asch., Letourn. & Schweinf. in Asch. & Schweinf., Mém. Inst. Egypt. 2: 94 (1887).

Greyish-pubescent annual 10-25 cm; stems much-branched from the base; branches wiry, white, sparsely pubescent, later glabrous; basal leaves 3.5-6 x 0.3-0.8 cm, oblanceolate to narrowly elliptic, short-petiolate, remotely dentate and ending in a saffron-yellow to orange spine, cobwebby on both surfaces, the midrib conspicuous on the lower surface and continuing into a spiny apex; cauline leaves 1-4.5 x 0.3-1.2 cm, oblong-elliptic, sessile, remotely 1-2-lobed, the lobes and apex ending in orange spines; capitula c. 1.5 x 1 cm, conical, solitary, in terminal cymes; peduncle 0.3-1.2 cm; phyllaries 5-6-seriate, the outer 0.5-1 cm, narrowly elliptic, leaf-like, much exceeding the capitulum; middle phyllaries 3.5-5 x 2-2.5 mm, broadly ovate, the apex abruptly ending within a yellowish-orange spinule 2-3.5 mm, the margins scarious, purplish; inner phyllaries 0.8-1.2 x 2.5-3 mm, oblong-lanceolate, glabrescent, the margins scarious, the midrib green and ending in a similar but shorter spinule; florets 1.2-1.5 cm; corollas yellowish; achenes c. 4 x 1.5 mm, narrowly obovoid, densely silky-hairy; pappus 0.8-1 cm, 1-seriate, of plumose bristles, connate at the base, deciduous.

De, S; sandy and rocky ground of desert wadis. Egypt, northwest Saudi Arabia, southern Iraq.

NOTE: The type of *Atractylis mernepthae* was collected in Egypt, "entre Suez et le fort d'Adjeroud", Wilkins *s.n.* (B?).

7. *Atractylis serratuloides* Sieber ex Cass., Dict. Sci. Nat. 50: 58 (1827).

Perennial 15-40 cm, woody and cobwebby at the base, glabrescent above; stems white, intricate; leaves narrowly linear, rigid, leathery, canaliculate; cauline leaves 4-10-lobed, the spines along the margins often 2-3-fid, yellowish; capitula 5-8 mm, numerous, discoid, narrowly cylindrical; outer phyllaries exceeding the capitulum, the inner ovate-spathulate, white-cobwebby, abruptly ending in a spinule; florets tubular; corollas purplish-pink, longer than the inner phyllaries; achenes c. 4 mm; pappus c. 6 mm, of plumose bristles.

De, S; sandy soils and rocky hillsides. Egypt, Palestine.

2. ***Atractylis prolifera*** Boiss., Diagn. Pl. Orient., ser. 1, 10: 96 (1849).

Cobwebby annual 10-25 cm; main stem short, ending in a short-pedicellate capitulum, branched from the base; branches procumbent or ascending; leaves 1.5-4 x 0.2-0.4 cm, narrowly linear, soft, minutely dentate, spinulose; upper leaves crowded below the capitulum and overtopping it; capitula c. 1.8 x 1.5 cm, campanulate, radiate; outer phyllaries slightly longer than the inner, pectinate; lateral spines on the pectinate involucre few, thin, remote, not or very slightly branched; inner phyllaries c. 1 x 0.4 mm, ovoid, tomentose, spine-tipped; marginal florets ligulate, radiant, with pink corollas, twice as long as the disc florets, with yellowish corollas; achenes c. 5 x 3 mm, hairy; pappus 8-9 mm, of plumose bristles.

M, S; sandy soils. North Africa, Sinai, Palestine, Arabia.

3. ***Atractylis cancellata*** L., Sp. Pl., ed. 1, 830 (1753).

Like *Atractylis prolifera* but lateral spines on the pectinate phyllaries numerous, rigid, branched above, simple at the base; all florets tubular, not radiate; corollas purplish-pink; achenes c. 3 x 2 mm.

M, S; sandy soils. Mediterranean region, Sinai, Arabia, eastwards to northern Iraq and western Iran.

4. ***Atractylis boulosii*** Täckh., Publ. Cairo Univ. Herb. 5: 25, f. 5b (1974).

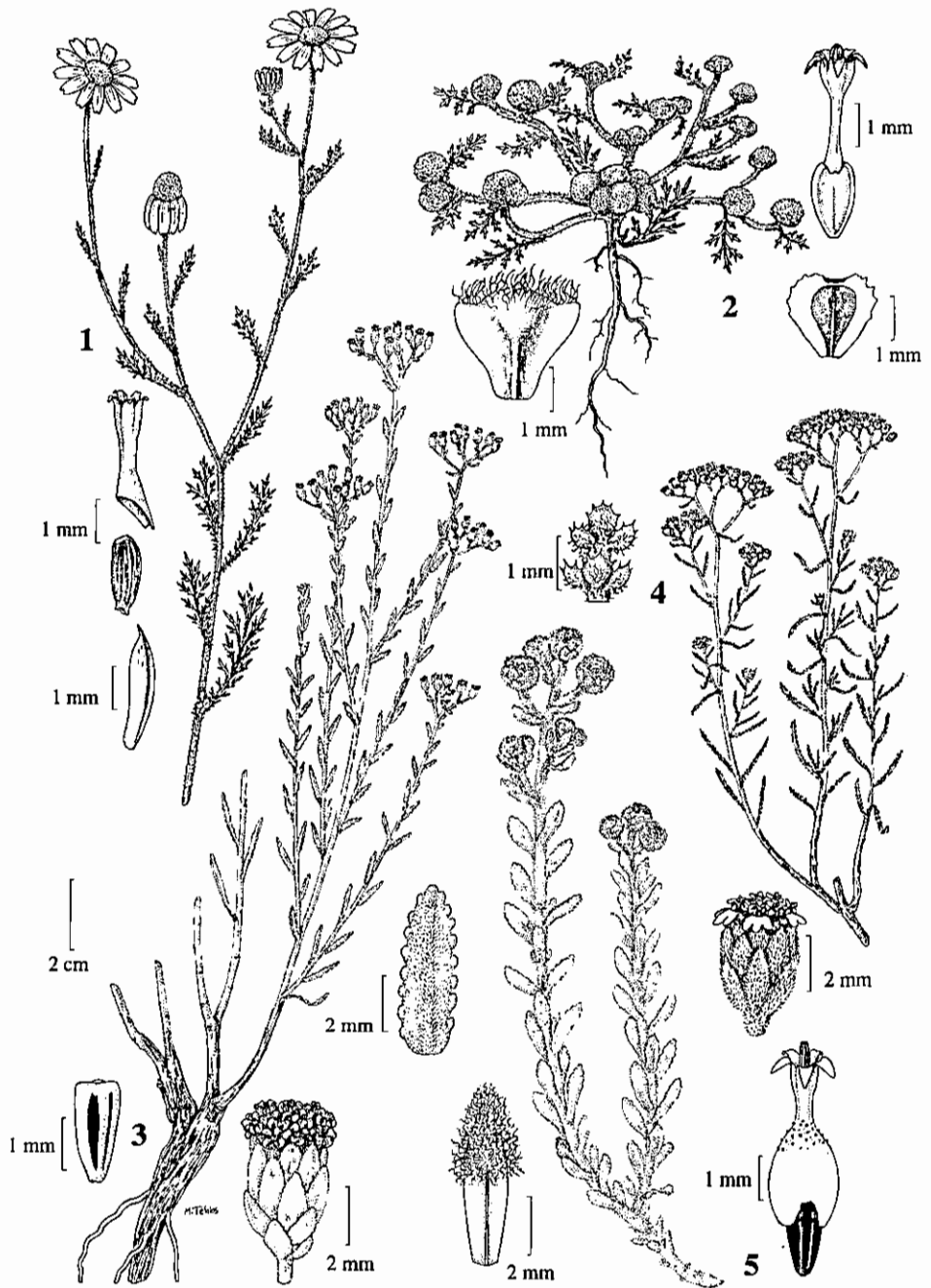
Cobwebby annual 10-20 cm; stems decumbent, branched from the base; leaves 1-2 x 0.1-0.3 cm, narrowly linear, subfolded, spiny-dentate, the uppermost just below the capitulum and overtopping it; capitula 1.5-2 cm diam., broadly cup-shaped; receptacle with numerous linear scarious paleae; outer phyllaries cobwebby, the apex obtuse and abruptly terminating in a short spine; corollas tubular, pink; achenes not seen; pappus of numerous plumose bristles.

? S; sandy soil. ? Sinai, Palestine (Gaza region).

NOTE: *Atractylis boulosii* is known only from type collection: 'Abasan, east of Khan Younis, Gaza Zone, Palestine, 11 September 1964, Boulos, s.n. (CAI !). The type locality is not far from the Egyptian frontier and the plant should be looked for in northern Sinai and probably in other adjacent regions.

5. ***Atractylis aristata*** Batt., Bull. Soc. Bot. France 49: 291 (1902).

Greyish-pubescent annual or short-lived perennial, 10-25 cm; stems branched, sulcate, villose, densely leafy; leaves 1.5-5 x 0.3-0.6 cm (excluding the spines), oblanceolate, narrowly elliptic to linear, densely appressed white-woolly on both surfaces, the lower short-petiolate, the upper sessile, remotely dentate and spiny; spines 2-6 mm, yellow; midrib conspicuous on the lower surface and continuing into an aristate apex; capitula 1.5-1.8 x 0.6-0.8 cm, narrowly campanulate to subcylindrical, solitary, in terminal cymes, subsessile, discoid; phyllaries 4-5-seriate, the outer conspicuous, leaf-like, exceeding the capitulum; middle phyllaries 5-8 x 2.5-3 mm, broadly ovate, aristate, pubescent except at the scarious purplish margins; inner phyllaries 1-1.2 x 0.15-0.2 cm, oblong-linear, scarious, aristate; florets c. 1 cm; corollas yellow; achenes 6-7 x 2 mm,



**Plate 60. COMPOSITAE:** *Chamaemelum mixtum* 1, flowering branch; floret, achene and palea (left: up to down). *Anacyclus monanthos* subsp. *monanthos* 2, habit; floret (up right); achene (down right); palea (down left). *Achillea fragrantissima* 3, habit; leaf (middle right); capitulum (down right); achene (down left). *Achillea santolina* 4, flowering and fruiting branch; branchlet with leaves (up left); capitulum (down left). *Otanthus maritimus* 5, flowering and fruiting branch; achene overtopped by the floret (down right); palea (down left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

1. **Chamaemelum mixtum** (L.) All., Fl. Pedem. 1: 185 (1785).  
Syns. *Anthemis mixta* L., Sp. Pl., ed. 1, 894 (1753).  
*Ormenis mixta* (L.) Dumort., Fl. Belg. 69 (1827).

Pilose annual 20-60 cm; stems branched, erect or ascending, sulcate; cauline leaves 2-5 x 0.5-1.2 cm, oblong-spathulate to oblong in outline, 2-pinnatisect; lobes 0.3-2.5 x 0.5 mm, linear-lanceolate, mucronate; lobes of the uppermost leaves shorter than those of the cauline, oblong, pinnatifid to pinnatipartite; peduncle 3-6 cm, thickened in fruit; capitula 2.5-3 cm diam.; phyllaries 2.5-3.5 x 0.8-1 mm, 2-seriate, lanceolate, the margins scarious, the apex obtuse, pilose along the green midrib; paleae 2 x 0.4 mm, linear-lanceolate, carinate, broadly scarious-margined, acute; ray limb c. 8 x 3.5 mm, oblong-elliptic, white; disc florets 3.5-4 mm, the base of the corolla obliquely saccate, forming a lanceolate spur covering the achene on one side; achenes 1.2-1.5 x 0.6 mm, obovoid, rounded at the apex.

M, S; sandy soils, edges of cultivation. Mediterranean region, extending to southwest Europe.

### 61. **Anacyclus** L.

Literature: Humphries, C. J. 1979. A revision of the genus *Anacyclus* L. (Compositae: Anthemideae).  
Bull. Br. Mus. Nat. Hist. (Bot.) 7 (3): 83-142.

Annual or perennial herbs; leaves alternate or in rosettes, pinnatisect; capitula solitary or in lax corymbs, pedunculate, sometimes aggregated, radiate or discoid; receptacle flat to conical, paleate; ray florets female, fertile, the tube flattened, persistent on the achenes; ray limb white or yellow; corolla of disc florets 5-lobed, sometimes with 2 larger lobes; tube slightly flattened and saccate; achenes flattened, thick-walled, winged; pappus absent. 12 species, Canary Islands, Mediterranean region, southwest Asia.

1. **Anacyclus monanthos** (L.) Thell., Mém. Soc. Nat. Sci. Cherbourg, sér. 4, 38: 518 (1912).  
Syn. *Tanacetum monanthos* L., Mant. 111 (1767).

Acaulescent villous annual, often with branches arising from the axils of the rosette leaves; branches, if present, 1-25 cm, further branched, slightly grooved; leaves 1-5 x 0.2-2.5 cm, spathulate in outline, petiolate, in rosettes in acaulescent plants, or alternate on the branches, 2-3-pinnatisect; ultimate lobes 1-4.5 x 0.5 mm, oblong-linear, mucronate; inflorescence a contracted cyme with radiating peduncles emerging from a reduced central stem; peduncles 0 or up to 1 cm, sometimes contracted to form a central synflorescence of 2-6 capitula or a single syncephalum 0.4-2.4(-3.5) cm, with 1-9 branches and 3-6(-12) terminal capitula, sparsely to densely villous; phyllaries 3-seriate, 2.5-4.5 x 0.5-2 mm, the outer triangular; inner phyllaries broadly triangular to oblong-linear, densely villous, scarious and green to brown above, thick below, the margins lacinate, the apex acuminate; paleae 3-4 x 0.6-2 mm, broadly obovate, the apex long-ciliate, cuspidate, canaliculate; florets 3-4 mm, discoid, bisexual, homomorphic, 5-lobed; achenes 1.8-2.5 x 1-2.5 mm, broadly obovate, the lateral wings 0.1-0.5 mm, thick, with a toothed margin; pappus absent.

Two subspecies are known, of which one occurs in Egypt:

x 0.5 mm, oblong-linear, mucronate; peduncle 1.5-4.5 cm, purplish; peduncle in fruit wiry, very slightly thickened; capitula 1-1.5 cm diam., solitary; phyllaries 2-seriate, 2.5-3 x 0.5 mm, oblong-linear, densely hairy, the margins scarious, the apex obtuse, the midrib green; receptacle conical; paleae 2-2.5 x 0.4 mm, oblong-lanceolate, long-acuminate, scarious; ray florets female, fertile, the limb 6-8 x 3-4 mm, oblong-elliptic, white, corolla-tube of disc florets 1.5 mm; achenes c. 0.5 mm, ribbed, rounded at the apex, black.

M, S; sandy soils. Endemic.

NOTE: *Anthemis microsperma* was described from Egypt, and all specimens examined are from Egypt. None of the neighbouring Floras give any mention of this species.

11. ***Anthemis hebronica*** Boiss. & Kotschy in Boiss., *Diagn. Pl. Orient.*, ser. 2, 5: 108 (1856).

Sparsely hairy annual 10-25 cm; stems erect or ascending, branched from the base, sulcate; leaves 1-2 x 0.6-1.2 cm, broadly obovate in outline, 2-pinnatisect; ultimate lobes 1-3 x 0.5-1 mm, oblong-linear, mucronate; peduncle 2-3 cm, elongate in fruit to 8 cm and slightly thickened and indurate; capitula 2-2.5 cm diam.; phyllaries 2-seriate, c. 3 x 1 mm, lanceolate, the margins scarious, the apex obtuse to subacute, the midrib green; receptacle conical; paleae c. 3.5 x 0.4 mm, oblong-lanceolate, long-mucronate; ray florets female, fertile, the limb 4-6 x 2.5-3.5 mm, oblong-elliptic, white; corolla-tube of the disc florets c. 1.8 mm, pilose at the base; achene 1.5-1.8 x 1 mm (excluding the auricle), broadly obconical, tuberculate; auricle 0.5 mm, 2-3-lobed.

S (Rafah); sandy soils. Sinai, Palestine, Lebanon, Syria, Iran.

12. ***Anthemis scrobicularis*** Yavin, *Israel J. Bot.* 21: 174 (1972).

Grey appressed-tomentose annual 8-20 cm; stems branched, erect or ascending, sulcate; leaves 1-2.8 x 0.5-1 cm, obovate in outline, pinnatisect; lobes 1-4.5 x 1-2 mm, few, remote, the margins slightly thickened, the apex obtuse, often with a small micro; peduncle 2.5-8 cm, very slightly thickened in fruit; capitula 2-2.5 cm diam.; phyllaries 3.5-4.5 x 1 mm, 2-seriate, tomentose, lanceolate, the margins scarious, the apex acute to subacute, the midrib greenish; receptacle conical; paleae 3.5 x 0.2 mm, narrowly oblong, acuminate; ray florets female, fertile, the limb 4-6.5 x 3-4 mm, oblong-elliptic, white; corolla-tube of disc florets 2.5 mm; achenes 2-2.2 x 0.6-0.8 mm, oblong-obconical, slightly curved, ribbed, with gland-like tubercles along the ribs, epappose.

S; sandy desert wadis. Sinai, Palestine, Arabia.

60. ***Chamaemelum*** Mill.  
Syn. *Ormenis* (Cass.) Cass.

Annuals, perennials or low shrubs; leaves alternate, pinnatifid or pinnatisect; capitula solitary or in lax corymbs, pedunculate, radiate, disciform or discoid; receptacle conical or elongate, paleate; paleae flattened or canaliculate, sometimes enclosing florets, often with a central resin canal; ray florets female, fertile or sterile, the limb white or yellow; corolla of disc florets 5-lobed, saccate at the base around the achene; achenes obovoid, thin-ribbed, with vascular strands; pappus absent. 6 species, Canary Islands Mediterranean region, southwest Asia.

Two subspecies occur in Egypt:

subsp. **melampodina**

Achenes indistinctly ribbed, strongly tuberculate.

O, M, D, R, S; sandy soils and alluvial desert plains. Egypt, Palestine.

subsp. **deserti** (Boiss.) Eig, Pal. J. Bot., Jerusalem ser., 1: 177 (1938).  
Syn. *Anthemis deserti* Boiss., Fl. Orient. 3: 305 (1875).

Achenes distinctly ribbed, slightly tuberculate.

M, De, S; sandy soils and desert plains. Egypt, Palestine.

NOTE: Syntypes of *Anthemis melampodina* were collected in Birkit el-Hâggy and a Nile island, Egypt, by Delile. These two subspecies are treated by some authors as separate species.

9. *Anthemis zoharyana* Eig, Pal. J. Bot., Jerusalem ser., 1: 178 (1938) var. **zoharyana**

Appressed-pubescent annual 10-25 cm; stems branched from the base, sulcate; leaves 1-2.5 x 0.5-1.2 cm, oblong in outline, pinnatisect, pectinate towards the base; lobes 1-4.5 x 0.5-1 mm, oblong-linear, remote, the apex mucronate; peduncle 2-6 cm, slightly thickened in fruit; capitula 2-2.5 cm diam.; phyllaries 2-seriate, 2.5-4 x 0.8-1.2 mm, the outer 2.5-3 cm, broadly lanceolate, pubescent, the margins scarious, the midrib green; inner phyllaries 3.5-4 cm, spatulate, the upper broader part scarious, entire or fimbriate and brownish; receptacle conical; paleae 2.5-3 x 0.6 mm, oblong-spatulate, acuminate, scarious; ray florets female, fertile, the limb 6-8.5 x 3-4.5 mm, oblong-elliptic, white; corolla-tube of disc florets 2.5 mm, inflated above, glabrous; achenes 1.5-2 x 0.8-1 mm, obpyramidal, strongly tuberculate, with deeply divided auricle longer than the achene, or a shorter auricle.

S; sandy soils. Sinai, Palestine, Arabia, Iraq.

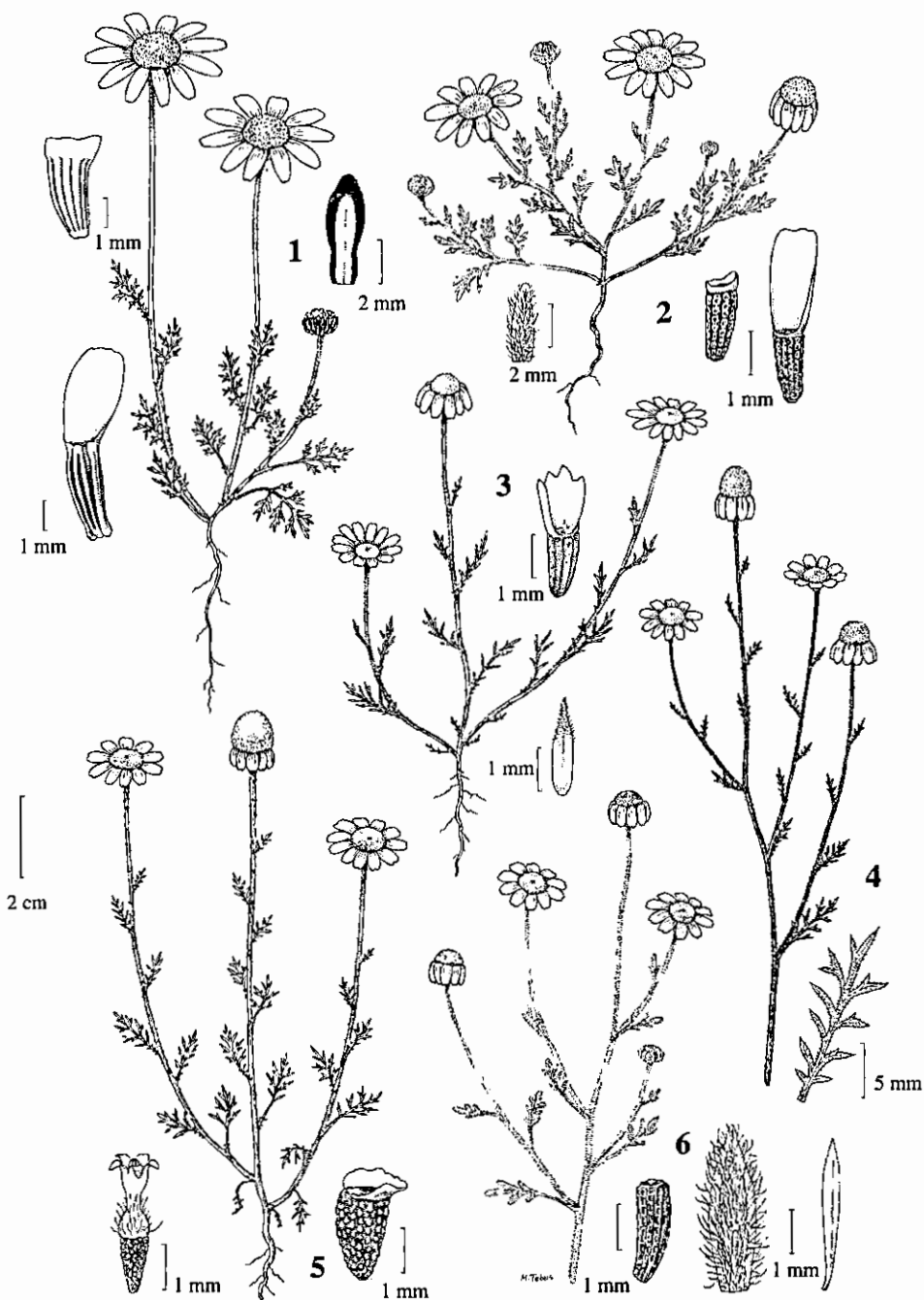
NOTE: According to Feinbrun-Dothan, Fl. Palaest. 3: 333 (1978), two varieties of *Anthemis zoharyana* are known: var. *zoharyana* and var. *brachyota* Eig, Palest. J. Bot., Jerusalem ser., 1: 179 (1938). These are separated, according to her, as follows:

- |   |                       |
|---|-----------------------|
| 1. Auricle as long as the achene or longer, cut into 3-5 triangular lobes;<br>inner phyllaries entire above | var. <b>zoharyana</b> |
| + Auricle shorter than the achene, ± entire; inner phyllaries fimbriate<br>above                            | var. <b>brachyota</b> |

The description given by Täckholm, Stud. Fl. Egypt, ed. 2, 574-575 (1974), certainly refers to var. *zoharyana*, although no mention was given about which variety is known from Egypt.

10. *Anthemis microsperma* Boiss. & Kotschy in Boiss., Diagn. Pl. Orient., ser. 2, 5: 108 (1856).

Appressed-pubescent annual 15-30 cm; stems much-branched, erect or ascending, wiry, sulcate, purplish; leaves 1-2 x 0.5-1 cm, oblong-obovate in outline, pinnatisect; lobes 1-3



**Plate 59. COMPOSITAE:** *Anthemis chia* 1, habit; phyllary (up right); two types of achenes (left). *Anthemis melampodina* subsp. *melampodina* 2, habit; phyllary (down left); two types of achenes (down right). *Anthemis zoharyana* var. *zoharyana* 3, habit; phyllary (down right); achene (middle within). *Anthemis microsperma* 4, flowering branch; leaf (down right). *Anthemis hebronica* 5, habit; floret (down left); achene (down right). *Anthemis scrobicularis* 6, flowering branch; achene, phyllary and palea (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

M; sandy coastal soils. Egypt, Palestine.

NOTE: *Anthemis indurata*, described from Alexandria, Egypt, by Delile (1814), is closely allied to *A. leucanthemifolia*, described by Boissier (1856) from Sidon (Saida), Lebanon. Eig (1938) recognized two subspecies of *A. leucanthemifolia*: he described subsp. *rafaensis* from Rafah ("Rafa") on the Egyptian border with Palestine; and reduced *A. philistea* Boiss. (Boiss. in Pl. Palest. exs. 1846), described from Gaza, to subsp. *philistea* (see synonyms). Feinbrun-Dothan, Fl. Palaest. 3: 228-329 (1978) reported the occurrence of *A. leucanthemifolia* in the Flora Palaestina area, with two subspecies: subsp. *leucanthemifolia* and subsp. *philistea*. She reported Palestine and southern Lebanon as the area of the species, but gave no mention of the occurrence of *A. indurata* in the Flora Palaestina area, although Post & Dinsmore, Fl. Syr., Palest. & Sinai, ed. 2, 2: 819-820 (1933) reported it from Palestine, based on a specimen collected by Eig from the Plain of Sharon. After examining the available material, including the type of *A. indurata* and a specimen of *A. leucanthemifolia*, collected by Gaillardot 107, (K!), from Sidon, and cited by Boissier, Fl. Orient. 3: 303 (1875), we came to the conclusion that both are distinct species. The two subspecies attributed to *A. leucanthemifolia* by Eig are indeed variants of *A. indurata*, and are listed here for the first time as synonyms of the latter. Feinbrun-Dothan, l. c., also reduced all the varieties described by Eig under subsp. *leucanthemifolia* and subsp. *philistea* to synonymy. The latter subspecies is listed here as a synonym of *A. indurata*. In summary, of these two closely related species only *A. indurata* is known from Egypt, while both *A. leucanthemifolia* and *A. indurata* occur in the Flora Palaestina area.

#### 7. *Anthemis chia* L., Sp. Pl., ed. 1, 894 (1753).

Syn. *Anthemis libanotica* DC., Prodr. 6: 9 (1838).

Pubescent annual 10-30 cm; stems branched from the base, erect, sulcate, often purplish; leaves 1-3 x 0.5-2 cm, oblong in outline, 2-pinnatisect; ultimate leaf-lobes 1-2.5 x 0.5-1 mm, oblong-lanceolate, the margins revolute, the apex mucronate; peduncle 2-8(-10) cm, sulcate; capitula 1-1.5 cm diam., solitary, radiate; phyllaries 3-4.5 x 1-1.5 mm, 3-seriate, oblong-lanceolate, imbricate, the margins conspicuously scarious and brown, undulate to fimbriate, the apex obtuse; ray florets female, fertile, the limb 0.8-1.2 x 0.3-0.4 cm, white; disc florets c. 2 mm; receptacle conical; paleae 2-2.5 x 1-1.2 mm, membranous, brownish towards the apex, deciduous at maturity; achenes 2.5-3 x 1-1.2 mm, obconical to subcylindrical, the outer with an entire auricle slightly longer and broader than the achene.

M; edges of cultivation. East Mediterranean region.

#### 8. *Anthemis melampodina* Delile, Descr. Egypte, Hist. Nat. 268, t. 45, f. 1 (1814).

Densely grey appressed-canescens annual, 5-25 cm; stems branched from the base, terete, slightly grooved; leaves 1-3 x 0.3-1.6 cm, oblong-obovate in outline, 1-2-pinnatisect; ultimate lobes 1-6 x 0.5-1.5 mm, oblong-linear, mucronate; peduncle 1-7 cm, slightly thickened and indurate in fruit; capitula 1.5-2.5 cm diam.; phyllaries 3.5-5 x 0.8-1 mm, 2-seriate, broadly lanceolate, appressed-canescens, the margins scarious, the apex obtuse; receptacle conical; paleae 3-4 x 0.5-0.8 mm, oblanceolate, acuminate to long-acuminate, scarious; ray florets female, fertile, the limb 6-9 x 3-4.5 mm, oblong, white; corolla-tube of disc florets 2-2.5 mm, conspicuously inflated in the lower half; achenes 1.5-1.8 x 0.6-0.8 mm (excluding the auricle), obconical, distinctly to indistinctly ribbed, strongly to slightly tuberculate, auriculate; auricle  $\pm$  as long as the achene, unilateral, or achene with a short rim.



4. **Anthemis pseudocotula** Boiss., Diagn. Pl. Orient., ser. 1, 6: 86 (1846).  
Syn. *Anthemis rotata* Boiss., Fl. Orient. 3: 318 (1875).

Appressed-hairy to glabrescent annual, 10-40 cm; stems much-branched, erect or ascending, sulcate; leaves 1.5-3.5 x 0.6-1.8 cm, ovate-oblong in outline, 2-pinnatisect; ultimate lobes 1-2.5 x 0.5-1 mm, oblong-elliptic to linear; peduncle 3-6.5 cm, conspicuously thickened and indurate in fruit, and often bent; capitula 1.5-2 cm diam.; phyllaries 3-3.5 x 1-1.5 mm, oblong-elliptic to lanceolate, scarious except on the green midrib, the apex obtuse to rounded; receptacle conical, covered with paleae only in its upper part; paleae 2-2.5 x 0.2 mm, acuminate and rigid at the apex; ray florets female; fertile, the limb 0.6-1 x 0.3-0.4 cm, white; corolla-tube of disc florets 2-2.5 mm, inflated at the base; achenes 1-1.5 x 0.6-0.8 mm, obconical,  $\pm$  tetragonal, ribbed, epappose or with auricle c. 0.3 mm, persistent at maturity.

N, O, M, D, S; sandy and alluvial soils, desert wadis and plains, edges of cultivation. East Aegean Islands, Cyprus, Turkey, Syria, Lebanon, Palestine, Egypt, Arabia, Iraq, Iran.

5. **Anthemis arvensis** L., Sp. Pl., ed. 1, 894 (1753).

Sparsely hairy to glabrescent annual, 15-40 cm; stems branched from the base, erect or ascending, sulcate; leaves 2.5-6 x 0.8-1.8 cm, obovate-oblong in outline, 3-pinnatisect; ultimate lobes 0.5-3 x 0.2 mm, linear-lanceolate to elliptic, mucronate; capitula 1.8-2.5 cm diam.; peduncle 0.5-3 cm; phyllaries 3.5-4.5 x 0.8-1 mm, 2-seriate, oblong-lanceolate, scarious except on the green midrib, the apex obtuse or subacute; receptacle conical in fruit; paleae 2.5-3 mm, narrowly lanceolate, acuminate; ray florets female, fertile, the limb 5-8 x 3-4 mm, oblong-elliptic; corolla-tube of disc florets c. 2.5 mm; achenes 1.5-2 x 0.75 mm, obconical, 10-ribbed, smooth, truncate at the apex, epappose.

S; cultivations and waste ground. Europe, southwest Asia, naturalized elsewhere.

6. **Anthemis indurata** Delile, Descr. Egypte, Hist. Nat. 363, t. 47, f. 3 (1814).

Syns. *Anthemis philistea* Boiss., Fl. Orient. 3: 302 (1875).

*Anthemis leucanthemifolia* Boiss. & Blanche subsp. *philistea* (Boiss.) Eig,  
Pal. J. Bot., Jerusalem ser., 1: 164 (1938).

*Anthemis leucanthemifolia* Boiss. & Blanche subsp. *rafaensis* Eig, Pal. J.  
Bot., Jerusalem ser., 1: 164 (1938).

*Anthemis eliezrae* Eig, Pal. J. Bot., Jerusalem ser., 1: 179, et errata (1938).

Appressed-hairy annual 5-25 cm; stems branched mainly from the base, procumbent or ascending; leaves 0.6-2.5 x 0.3-0.8 cm, spatulate in outline, rather fleshy and with thickened margins, variable: pinnatipartite and 3-lobed at the apex, or pinnatipartite, not lobed at the apex, with cuneate base; or margins entire, except at the 3-lobed apex; leaf-lobes 1-4 x 0.5-1.6 mm, oblong-linear, all mucronate; sometimes with minute pectinate teeth near the base; peduncle 0.5-2.5(-3) cm, conspicuously thickened and indurate in fruit; capitula 1.5-2 cm diam., solitary, radiate; phyllaries 3-3.5 x 1 mm, (1-)2-seriate, broadly lanceolate with scarious margins, the apex obtuse; receptacle convex to conical, covered throughout with paleae; paleae 3-4 x 1 mm, oblanceolate, scarious, with a central midrib, long-acuminate; ray florets female, fertile, the limb 5-7 x 2.5-3.5 mm, broadly elliptic, white; corolla-tube of disc florets c. 1.5 mm, infundibular; achenes 1.2-1.5 x 0.75-1 mm, obconical to almost cylindrical, obscurely ribbed, smooth, white, the apex truncate with a short crown.

N, De; sandy and alluvial soils, edges of cultivation. Atlantic Islands, Europe, Mediterranean region, naturalized weed in many temperate regions.

2. ***Anthemis retusa*** Delile, Descr. Egypte, Hist. Nat. 74 (1814).

Syn. *Anthemis cairica* Vis., Pl. Quaed. Aegypt. 36, t. 6 (1836).

Glabrescent to appressed-hairy annual, 15-50 cm; stems much-branched, sulcate; leaves 1.2-5.5 x 0.5-2 cm, ovate-oblong in outline, 2-3-pinnatisect, sessile; ultimate lobes 1.5-7 x 1 mm, oblong-linear, mucronate; peduncle to  $\bar{7}$  cm, not thickened at maturity; capitula solitary, radiate; involucre subglobose; phyllaries 2-3 x 0.8 mm, 1-2-seriate, scarious except on the green midrib, the apex obtuse to rounded; receptacle conical, paleate throughout; paleae 2-3 x 0.2 mm, linear, subacate; ray florets female, fertile, the limb 1-1.2 x 0.2-0.3 cm, elliptic to narrowly elliptic; corolla-tube of disc florets 1.2 mm; achenes 1.2 x 0.4 mm,  $\pm$  terete, not tuberculate, slightly grooved, tapering towards the base, truncate at the apex, epappose, caducous at maturity.

N, S; cultivated ground. Egypt, Palestine, Lebanon, Saudi Arabia.

NOTE: *Anthemis retusa*, described by Delile from Egypt, is a fairly widespread weedy species in cultivated ground within the Nile region in Upper and Lower Egypt. Outside Egypt three specimens from three countries have so far been traced: one from Jordan, collected 13 March 1953 by N. D. Simpson 53.160 (K!); one from Beirut, Lebanon, collected 24 May 1877 by G. E. Post 778 (K!) and one from Jeddah, Saudi Arabia, collected August 1881 by J. Zohrab s. n. (K!). Post & Dinsmore, Fl. Syria, Palest., Sinai, ed. 2, 2: 56 (1933), also reported this species from Jerusalem, ? Jaffa and Sinai. However, there is no mention of *Anthemis retusa* by Feinbrun-Dothan, Fl. Palaest. 3: 326-339 (1978) nor by Moularde, Nouv. Fl. Liban, Syrie 3: 402-415 (1983). Ghafoor & Al-Turki, in their synopsis of the genus *Anthemis* in Saudi Arabia, Candollea 52: 457-474 (1997) gave no mention of its occurrence in Saudi Arabia.

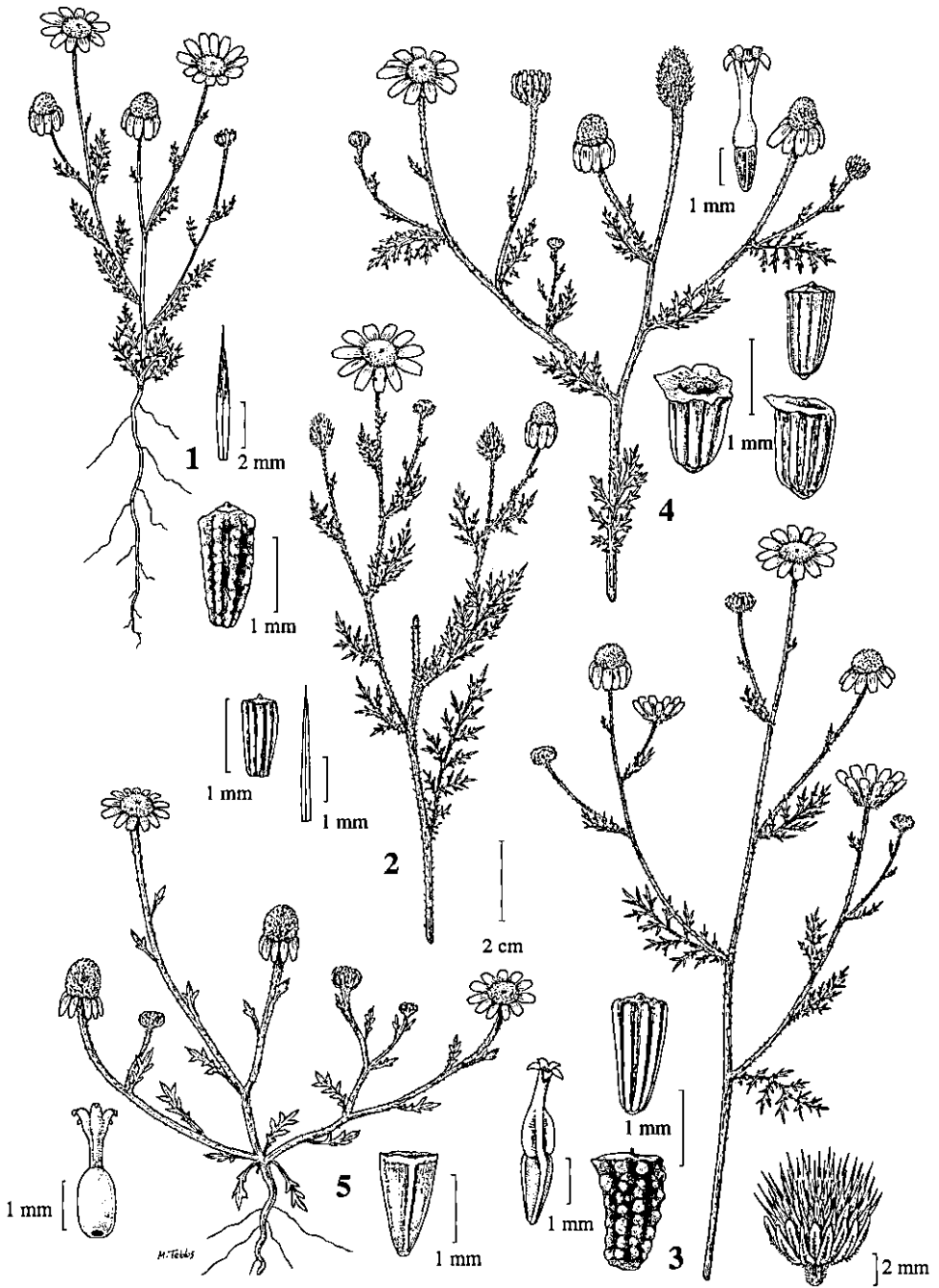
3. ***Anthemis bornmuelleri*** Stoj. & Acht., Notizbl. Bot. Gart. Berlin 13: 522 (1937).

Syn. *Anthemis galilaea* Eig., Pal. J. Bot., Jerusalem ser., 1: 201 (1938).

Sparsely pubescent annual 10-40 cm; stems branched, sulcate; leaves 0.5-3.5 x 0.3-1.6 cm, ovate-oblong in outline, 2-3-pinnatisect, the cauline sessile, the lowermost short-petiolate; leaf-segments rather remote; ultimate lobes 1-3.5 x 0.2-0.5 mm, linear to narrowly lanceolate, mucronate; peduncle 1.5-3.5 cm, slightly thickened in fruit; capitula 1.5-2 cm diam.; phyllaries 2-3 x 0.8-1 mm, 1-2-seriate, oblong-obovate, scarious except on the narrow green midrib, the outer subacate, the inner obtuse to rounded; receptacle conical, covered throughout with paleae; paleae 2.5-3 x 0.15 mm, linear-subulate; ray florets female, fertile, the limb 5-6 x 2-3.5 mm, oblong-elliptic, white; corolla-tube of disc florets c. 2 mm, inflated at the base; achenes 1-1.5 x 0.5-0.8 mm, turbinate-cylindrical, truncate at both ends, conspicuously ribbed, smooth or slightly tuberculate, whitish, epappose or auriculate, caducous at maturity.

S; cultivated ground, roadsides. Sinai, Palestine, Lebanon, Syria, Saudi Arabia, Cyprus, Samos.

NOTE: The above description is based on material from Palestine and Saudi Arabia, no specimens were available from Egypt.



**Plate 58. COMPOSITAE:** *Anthemis cotula* 1, habit; achene and palea (down right). *Anthemis retusa* 2, flowering and fruiting branch; achene and palea (down left). *Anthemis bornmuelleri* 3, flowering branch; fruiting capitulum (down right); two types of achenes and floret (down left). *Anthemis pseudocotula* 4, flowering and fruiting branch; floret (up within); three types of achenes (right). *Anthemis indurata* 5, habit; floret (down left); achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs

- |   |                             |    |
|---|-----------------------------|----|
| 1. Achenes epappose, with gland-like tubercles along the ribs   | 12. <i>A. scrobicularis</i> | 2  |
| + Achenes with a crown or an auricle, not pitted or with gland-like tubercles along the ribs  |                             |    |
| 2. Paleae of the receptacle bristle-like  |                             | 3  |
| + Paleae of the receptacle oblong-lanceolate or oblanceolate, scarious, not bristle-like  |                             | 6  |
| 3. Ray florets sterile  | 1. <i>A. cotula</i>         | 4  |
| + Ray florets female, fertile   |                             |    |
| 4. Peduncle conspicuously thickened and indurate in fruit; mature achenes persistent  | 4. <i>A. pseudocotula</i>   | 5  |
| + Peduncle not or slightly thickened in fruit; mature achenes falling   |                             |    |
| 5. Achenes tapering towards the base, slightly grooved, not ribbed  | 2. <i>A. retusa</i>         |    |
| + Achenes truncate at both ends, conspicuously ribbed   | 3. <i>A. bornmuelleri</i>   |    |
| 6. Paleae of the receptacle falling at maturity; outer achenes with an entire auricle, slightly longer and broader than the achene    | 7. <i>A. chia</i>           |    |
| + Paleae of the receptacle persistent at maturity; outer achenes not auricled, or with a lobed auricle                                |                             | 7  |
| 7. Corolla-tube pilose at the base  | 11. <i>A. hebronica</i>     | 8  |
| + Corolla-tube entirely glabrous  |                             |    |
| 8. Leaves 3-pinnatisect   | 5. <i>A. arvensis</i>       | 9  |
| + Leaves 1(-2)-pinnatisect, pinnatifid, or simple and pectinate-dentate   |                             |    |
| 9. Plant densely grey appressed-canescens   | 8. <i>A. melampodina</i>    | 10 |
| + Plant glabrous or sparsely hairy  |                             |    |
| 10. Achenes with a deeply divided auricle, longer than the achene   | 9. <i>A. zoharyana</i>      | 11 |
| + Achenes with a short crown  |                             |    |
| 11. Stems and peduncles green; peduncles in fruit conspicuously thickened and indurate; achenes 1-1.5 mm, truncate at the apex        | 6. <i>A. indurata</i>       |    |
| + Stems and peduncles purplish; peduncles in fruit wiry, very slightly thickened and indurate; achenes c. 0.5 mm, rounded at the apex | 10. <i>A. microsperma</i>   |    |

1. *Anthemis cotula* L., Sp. Pl., ed. 1, 894 (1753).

Glabrescent annual 5-30 cm; stems branched, sulcate; leaves 1-2.5 x 0.3-1.2 cm, obovate-oblong in outline, finely 2-3-pinnatisect, subsessile; ultimate lobes 1-2.5 x 0.5 mm, oblong to oblong-lanceolate, entire or 2-3-dentate, mucronate; peduncle 1.5-4.5 cm, slender, not thickened at maturity; capitula 1-1.5 cm diam., solitary, radiate; involucre subglobose; phyllaries c. 3 x 0.6 mm, 1-2-seriate, oblong to oblong-lanceolate, scarious-margined, with a green midrib, obtuse; receptacle conical, paleate only in upper part; paleae 2.5-3 mm, linear-subulate, bristle-like towards the apex; ray florets sterile, the limb 5-7 x 2.5-4 mm, broadly elliptic; corolla-tube of disc florets 1.5 mm, ± cylindrical; achenes 1.2-1.8 x 0.5 mm, narrowly obconical, ribbed, tuberculate, epappose.

## 58. *Flaveria* Juss.

Syns. *Vermifuga* Ruiz & Pav., *Brotera* Spreng., *Nauenbergia* Willd.

Literature: Powell, A. M. 1978. Systematics of *Flaveria* (Flaveriinae-Asteraceae). Ann. Missouri Bot. Gard. 65 (2): 590-636.

Annual or perennial herbs or shrubs; leaves opposite and decussate, often connate, rarely perfoliate; capitula in corymbose or axillary glomerules, often sessile, radiate or discoid; phyllaries 2-5; ray florets, if present, 1-2, usually small, female, yellow; disc florets 1-15, all corollas yellow; achenes narrow, 10-ribbed, usually larger in ray than in disc florets; pappus 0 or rarely of 2-4 scales or a short crown. 21 species, southern United States, Central and South America, Australia, 2 pantropical: *Flaveria bidentis* and *F. trinervia*.

### 1. *Flaveria bidentis* (L.) Kuntze, Rev. Gen. 3: 148 (1898).

Syns. *Ethulia bidentis* L., Mant. 110 (1767).

*Eupatorium chilense* Molina, Sagg. Chile 142 (1789).

*Milleria chiloensis* Juss., Gen. Pl. 187 (1789), pro syn.

*Milleria contrayerba* Cav., Icon. 1: 2 (1791).

*Vermifuga corymbosa* Ruiz & Pav., Syst. Veg. 216 (1798).

*Flaveria contrayerba* (Cav.) Pers., Syn. Pl. 2: 489 (1807).

*Flaveria bonariensis* DC., Prodr. 5: 635 (1836).

For full synonymy see Powell (1978), p. 623.

Glabrescent annual 20-60(-80) cm; stems much-branched; leaves 3.5-10 x 0.6-1.8 cm, lanceolate-elliptic, sparsely serrate to subentire, acute, petiolate or with the bases almost connate; capitula small, in congested scorpioid terminal glomerules, irregularly rayed; involucre c. 5 x 1 mm,  $\pm$  cylindrical; phyllaries 2-seriate, obtuse, the outer 1-2, 2 x 1 mm, broadly ovate, the inner 3(-4), oblong-elliptic, obtuse; ray florets 2-3 mm; corollas pale yellow; disc florets 3-8, 3-3.5 mm; achenes of ray florets 2.5 mm, cylindrical, black; achenes of disc florets 2 x 0.5 mm, ellipsoid, black; pappus absent.

O, M, S; moist ground, edges of cultivation. Pantropical weed.

## 59. *Anthemis* L.

Literature: Eig, A. 1938. Taxonomic studies on the oriental species of the genus *Anthemis*. Pal. J. Bot., Jerusalem ser. 1: 161-224.

Ghafoor, A. & Al-Turki. 1997. A synopsis of the genus *Anthemis* L. (Compositae-Anthemideae) in Saudi Arabia. Candollea 52: 457-474.

Ghafoor, A. & Ali, S. J. 2002. The genus *Anthemis* L. (Compositae) in Iraq: a synopsis. Comp. Newsl. 38: 1-41.

Annual or perennial herbs or low shrubs; leaves 1-2(-3)-pinnatisect, rarely lobed or entire; capitula solitary or corymbose, pedunculate, radiate; involucre usually subglobose; phyllaries 1- to multi-seriate; receptacle convex or conical, paleate, rarely partly or totally epaleate; paleae equalling the disc florets or longer, scarious or bristle-like; ray florets 10-12, female, fertile or sterile, white, rarely yellow or reddish; disc florets numerous, the corolla 5-lobed, yellow or rarely reddish; corolla-tube swollen at the base in fruit; achenes persistent or deciduous, obconical or obpyramidal, round or almost square in cross section, or dorsiventrally compressed,  $\pm$  10-ribbed or tuberculate, with a crown or an auricle, or epappose, the rim at the apex sometimes elevated or thickened. About 210 species, Mediterranean region, Europe, Asia, 1 species in East Africa, some widespread weeds, some cultivated ornamentals.

florets yellow, orange or white; achenes compressed, winged; those of disc florets triquetrous; pappus of ray florets of 2-3 awns, often connate to the wings, those of disc florets mostly with 2 awns, rarely obsolete. About 150 species, North, Central and South America, some naturalized elsewhere, some cultivated ornamentals.

1. **Verbesina encelioides** (Cav.) Benth. ex A. Gray, Bot. Calif. 1: 350 (1876).

Syn. *Ximenesia encelioides* Cav., Icon. 2: 60, t. 178 (1793).

Strigose greyish annual 20-80 cm; stems much-branched, sulcate; leaves 3-10 x 1-4(-5) cm, deltoid to lanceolate, the lower opposite, the upper alternate, coarsely serrate to subentire, acute; petiole 1-3.5 cm; capitula 1.5 x 2.5 cm, in terminal lax cymes, radiate; peduncle 3-12 cm, ebracteate; phyllaries 2-seriate, 0.8-1.4 x 0.1-0.3 cm, narrowly lanceolate, subacute, strigose; paleae 6-8 x 0.5 mm, scarious, acuminate and scabrid at the apex; outer florets radiate, fertile, the rays 1-2 x 0.5-0.8 cm; disc florets to 100, yellow; achenes of outer florets 3-4 x 2 mm, compressed, glabrous, wingless; achenes of disc florets 5-6.5 x 2 mm (excluding the wings); wings 1-1.5 mm diam., whitish; pappus 2-2.5 mm, of 2 filiform awn-like bristles.

N (Aswan), O (Kharga), S (El-Arish); waste ground, roadsides, edges of cultivation. Native to South and Central America, naturalized in many regions of the Old World, pantropical weed.

### 57. **Tagetes** L.

Annual or perennial pungent-aromatic herbs; leaves opposite, the upper alternate, pinnatisect or simple; capitula solitary or few together in corymbose inflorescences, radiate or discoid; phyllaries 1(-2)-seriate, the outer minute, the inner connate into a campanulate or fusiform cup; corollas of ray florets few, variously coloured; disc florets numerous, with variously coloured corollas; achenes clavate to linear, angular or terete; pappus of 3-10 ± connate scales and/or bristles. About 50 species, North and South America, some weedy species, some cultivated ornamentals.

1. **Tagetes minuta** L., Sp. Pl., ed. 1, 887 (1753).

Glabrous pungent-aromatic annual, 10-30 cm (to 1.5 m in other countries); stems erect, much-branched, sulcate; leaves 2-6 x 1-3 cm, glandular-punctate, the lower opposite, the upper alternate, pinnatisect; segments 1-3 x 0.1 cm, linear-lanceolate; capitula numerous, in dense corymbs; involucre cylindrical; phyllaries 3-4, 0.8-1.2 x 0.15-0.25 cm, yellowish-green, with distinctive dark glands, linear-oblong, almost connate to a rounded apex, forming a tubular sheath around the achenes; ray florets 3-5, 4-4.5 mm, with pale yellow corollas, the limb 3-toothed; disc florets 4-5, 3-4.5 mm, with green corollas; achenes 5-6 x 0.5-1 mm, linear-fusiform, angled, black, with appressed white hairs; pappus 1.5-3 mm, of 3-5 white unequal scales connate at the base.

N (Khanka, Belbeis), waste ground, roadsides, lawns. Native to South America, naturalized in most of the warmer parts of the world, now spreading in the East Mediterranean region.

NOTE: *Tagetes minuta* is known from two localities in Egypt: Khanka and Bilbeis, both north of Cairo. The collected specimens are minute (Simpson 3559, K!; Hadidi & Khattab s.n., K!), hardly 12 cm tall, in flowering stage. The achene description is based on a specimen collected in Arabia.

cm, sometimes lacking; disc florets 0.8-1.2 cm, yellow; achenes 0.8-1.1 x 0.1 cm (excluding the bristles), blackish, linear-tetragonal, ribbed, minutely tuberculate; marginal achenes shorter and compressed; bristles 3-4, 2-3 mm, yellowish.

N, M, De, S; weed of cultivation, canal banks, roadsides, waste ground. Most tropical and subtropical regions of the world, extending into some temperate areas, often a noxious weed of cultivation in some countries.

2. ***Bidens schimperi*** Sch. Bip. in Walp., Repert. Bot. Syst. 6: 168 (1846).

Syns. *Bidens schimperi* Sch. Bip. var. *pilosa* Sch. Bip. ex Schweinf. & Asch. in Schweinf., Beitrag Fl. Aethiop. 1: 142 (1867), nom. nud.

*Bidens punctata* Sherff, Bot. Gaz. 59: 302 (1915).

*Bidens acutiloba* Sherff, Bot. Gaz. 76: 147 (1923).

*Bidens schimperi* Sch. Bip. var. *punctata* Sherff, Bot. Gaz. 85: 17 (1928).

For full synonymy see Mesfin Tadesse (1993).

Puberulent annual 0.25-1.5 m, or more; stems branched, striate; leaves 3.5-12 x 1.5-4.5 (-6) cm, 2-pinnatisect, petiolate; lobes elliptic, acute, black-dotted; capitula in lax cymes, pedunculate, 0.8-1.2 x 0.8-1.2 cm, to 1.6 x 1.6 cm in fruit; phyllaries 2-3-seriate, the outer 0.8-1.1 x 0.1-0.2 cm, herbaceous, narrowly oblanceolate with a median midrib, black-dotted in the upper half, the apex rounded; inner phyllaries 8-9 x 2-3 mm, elliptic-lanceolate, scarious-margined, the apex obtuse; ray florets conspicuous, to 2 x 0.6 cm; corollas yellow, with darker yellowish-brown veins; disc florets 6-8 mm; achenes 0.8-1.4 x 0.2-0.3 cm (excluding the bristles), oblong-elliptic to narrowly oblong, not attenuate towards the blunt apex, much compressed, always with 2 bristles.

GE; hillsides and wadi beds. Southeast Egypt, Sudan, Ethiopia, Eritrea, Djibouti, Kenya, Tanzania, Angola, Namibia, Botswana, Zambia, Malawi, Mozambique, Zimbabwe, South Africa (see note under *Bidens bipinnata*).

3. ***Bidens bipinnata*** L., Sp. Pl., ed. 1, 832 (1753).

For synonyms see Sherff (1937).

Like *Bidens schimperi*, but leaves without black dots; outer phyllaries linear, 0.5-0.8 mm broad, the apex subacute; achenes 1.4-2 x 0.1 cm (excluding the bristles), linear, not compressed, attenuate towards the apex, with 3-4 bristles.

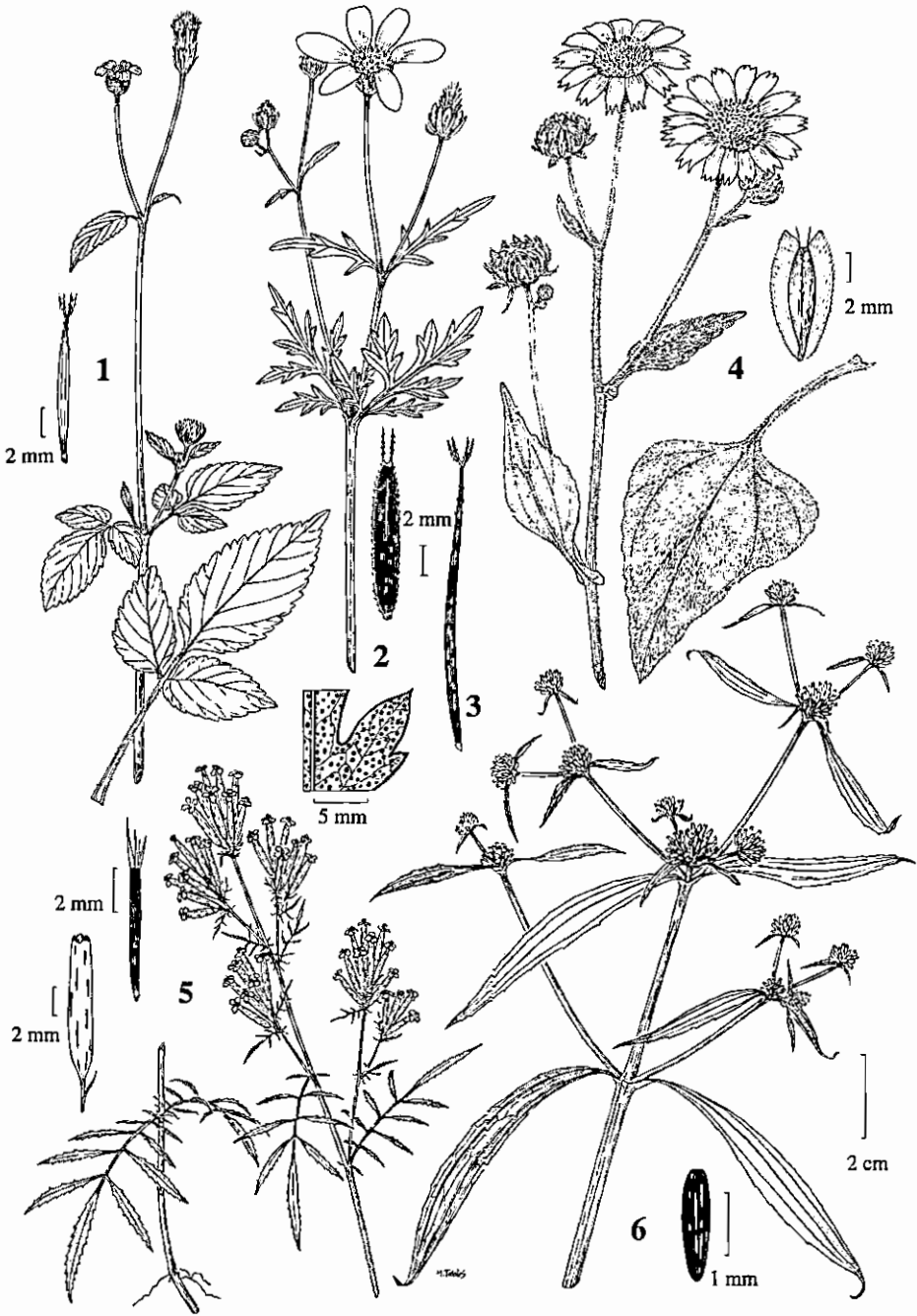
GE; hillsides and wadi beds; naturalized. North and South America, Europe and Asia, introduced in Africa, known from southeast Egypt, West and southern Africa.

NOTE: According to Täckholm (1974, p. 571), *Bidens bipinnata* and *B. schimperi* cover large areas of the ground of Gebel Elba district. The achenes cling to every kind of cloth and also to the skin, penetrating and hurting.

56. ***Verbesina*** L., nom. conserv.

Syns. *Actinomeris* Nutt., *Chaenocephalus* Griseb.

Annual or perennial herbs, shrubs or small trees; leaves opposite or alternate, dentate or lobed, often decurrent along the stems; capitula solitary, corymbose or paniculate, radiate, discoid or disciform; phyllaries 2-6-seriate; receptacle paleaceous; ray florets female, sterile or rarely neuter with yellow, white or orange corollas; corollas of disc



**Plate 57.** COMPOSITAE: *Bidens pilosa* 1, flowering branch and basal leaf; achene (left). *Bidens schimperi* 2, flowering branch; achene (down right, close to the flowering branch); part of the leaf (down). *Bidens bipinnata* 3, achene only (longer achene, right to the achene of *B. schimperi*). *Verbesina encelioides* 4, flowering branch; inner winged achene (up right); basal leaf (down right). *Tagetes minuta* 5, flowering branch; branchlet with lower leaves (down left); achene and glandular involucre (up left). *Flaveria bidentis* 6, flowering branch; achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.



1. *Galinsoga parviflora* Cav., Icon. Descr. 3: 41, t. 281 (1791).

Annual 20-60 cm; stems branched, glabrous or sparsely hairy; leaves 1.5-6 x 1-2.5 cm, ovate, entire or obscurely serrate, subacute, the upper sessile, the lower petiolate; petiole 0.3-1.5 cm; capitula 3-5 mm diam.; phyllaries 2.5-3.5 mm, broadly ovate, the outer with green veins; paleae 3-fid; ray florets c. 5 mm, white, hairy at the base; disc florets 3-3.5 mm; corollas tubular, 5-dentate; achenes 1.2-1.5 x 0.4-0.5 mm, obconical, black, with white setaceous hairs; pappus 1 mm, of persistent scales connate at the base.

N; cultivated and waste ground. Native to South America, naturalized in North America, Europe and elsewhere.

NOTE: *Galinsoga parviflora* has recently been introduced and naturalized in the Nile delta.

55. *Bidens* L.

Syn. *Microlecan* (Sch.Bip.) Benth.

Literature: Sherff, E. E. 1937. The genus *Bidens*, I & II. Field Mus. Nat. Hist., Bot. Ser. 16: 1-709.

Mesfin Tadesse. 1993. An account of *Bidens* (Compositae: Heliantheae) for Africa. Kew Bull. 48: 437-516.

Annual or perennial herbs, or shrubs; leaves usually opposite, rarely whorled, simple or 2-3-pinnatisect; capitula solitary or in lax cymes, pedunculate; outer phyllaries herbaceous, nerved; inner phyllaries connate at the base or free, with scarious margin; paleae membranous; ray florets sterile or female; disc florets bisexual, the corollas (4-)5-lobed; anthers brown or black, caudate or sagittate at the base; achenes compressed or 3-4-angled, oblong-linear to obovate, strigose or glabrous, the margins setulose; apex with or without a cupuliform corona, bristles and 0-4(-5) aristae; bristles retrorsely barbed; aristae paleaceous and flattened, or setaceous and triquetrous. About 240 species, worldwide, but especially North and South America.

1. Ray florets white, or capitula rayless (weed of cultivation) 1. *B. pilosa*  
+ Ray florets yellow (Gebel Elba) 2

2. Achenes 0.8-1.4 x 0.2-0.3 cm excluding the bristles,  
oblong-elliptic to narrowly oblong, much compressed, not attenuate  
towards the apex, always with 2 rigid bristles 2. *B. schimperi*

+ Achenes 1.4-2 x 0.1 cm excluding the bristles, linear, not compressed,  
attenuate towards the apex, with 3-4 fine bristles 3. *B. bipinnata*

1. *Bidens pilosa* L., Sp. Pl., ed. 1, 832 (1753).

Syns. *Bidens sudanica* Blume, Bijd. Nat. Wetens. 1: 913 (1826).

*Bidens pilosa* L. var. *minor* (Bl.) Sherff, Bot. Gaz. 80: 387 (1925).

For full synonymy see Mesfin Tadesse (1993).

Annual 0.2-1.2 m, almost glabrous to sparsely hairy; stems erect, branched, striate; leaves petiolate, pinnate, with 3(-5) leaflets; leaflets 1.8-6(-8) x 1-3.5(-5) cm, ovate, serrate, acute or subacute, petioliolate, the terminal largest and with longer petioliole than the laterals; capitula 0.8-1.2 x 0.8-1.2 cm, elongate in fruit; phyllaries 2-3-seriate, the outer 4-7 x 1-1.2 mm, oblong-linear, obtuse, connate at the base; inner phyllaries narrower and slightly longer, subacute, the margins scarious; ray limb 0.6-1.2 x 0.2-0.4

*Blainvillea rhomboidea* Cass. var. *polycephala* (Gardner) Baker in Mart.,  
Fl. Bras. 6(3): 176 (1884).

*Blainvillea rhomboidea* Cass. var. *racemosa* (Gardner) Baker in Mart., Fl.  
Bras. 6(3): 176 (1884).

*Ceratocephalus acmella* (L.) Kuntze, Rev. Gen. Pl. 1: 326 (1891).

*Coreopsis acmella* (L.) Krause, Beih. Bot. Centralb. 32: 340 (1914).

*Wedelia gossweileri* S. Moore, J. Bot. 56: 232 (1918).

Hirsute annual 0.2-0.8(1.2) m, covered with short appressed, white bulbous hairs; juvenile stems and branches angular, later terete and wiry, all sulcate; leaves 2.5-10 x 1.5-3.5 cm, ovate, serrate, acute to acuminate, the base slightly cuneate and 3-nerved; petiole 0.5-1.5 cm, pilose; capitula c. 1 x 0.6-1 cm, axillary or in terminal lax cymes, oblong at anthesis, subglobose in fruit; phyllaries 3-4-seriate, the outer 6-8 x 2-2.5 mm, lanceolate, subacute, herbaceous, densely pubescent; inner phyllaries 5-7 x 2 mm, oblong, rather accrescent, abruptly tapering to a rigid spine; ray limb of outer female florets c. 1 mm, white; achenes 5 x 1.5-2 mm, narrowly obpyramidal, angled, tuberculate; pappus 1-2.5 mm, of a cupule from which arise 2-3 unequal barbellate awns.

GE; moist ground, around wells. Native to tropical South America, naturalized in Cape Verde Islands, tropical Africa, southeast Egypt, Arabia, India, China, Sri Lanka, Burma, Singapore, Australia, and probably elsewhere.

NOTE: Täckholm (1974), p. 571-572, enumerated two species of *Blainvillea* from Gebel Elba, Southeast Egypt, namely *B. rhomboidea* Cass. and *B. priureana* DC. She added that the latter is very similar to the former, and separated them by the achene character: glabrous or hispid, terminated by 3 or 2 bristles. On the other hand, Boulos (1995), p. 157, also listed two species: *B. gayana* Cass. (Syn. *B. priureana* DC.) and *B. acmella* (L.) Philipson (Syns. *B. rhomboidea* and other three synonyms). *Blainvillea priureana* DC. has proved to be a synonym of *Aspilia helianthoides* (Schum. & Thonn.) Oliv. & Hiern, i.e. belonging within *Aspilia* Thouars. After examining much material throughout the range of the above 'two' species, we have come to the conclusion that we are, in fact, dealing with one extremely polymorphic species, *Blainvillea acmella*. It is native to tropical South America, but completely naturalized in numerous regions of the Old World, apparently in a diversity of habitats. This has resulted in numerous described species, treated here as synonyms (see synonymy and geographical distribution).

#### 54. *Galinsoga* Ruiz & Pav.

Syn. *Stemmatella* Wedd. ex Benth.

Literature: Canne-Hilliker, J. M. 1992. An emended description, chromosome counts, and a key to South American *Galinsoga* (Asteraceae, Heliantheae). Taxon 41: 661-666.

Annuals; leaves opposite, simple; capitula small, few together, radiate or rarely discoid; phyllaries 1-3-seriate; receptacle conical, with narrow paleae; ray florets female, widely 3-lobed, rarely bilabiate; corollas of ray florets white to purplish; corollas of disc florets yellow, rarely purple; ray achenes obconical or obpyramidal, usually compressed, enclosed by connate phyllaries and paleae; disc achenes obconical, obpyramidal or subterete, 4-5-angled; pappus of fimbriate, laciniate or aristate scales, rarely of bristles, often absent in ray florets. 13 species, North and South America, 2 cosmopolitan weeds: *G. parviflora* and *G. quadriradiata*.

stems branched from the base, sulcate, erect, ascending or prostrate; leaves 2-12 x 0.3-1.8 cm, oblong-elliptic, lanceolate or oblong-lanceolate, opposite, sessile, the apex subacute to acute; capitula axillary, on slender peduncles 1-8 cm; involucre 7-9 mm broad; outer phyllaries 4 x 2 mm, broadly lanceolate, subacute, covered with appressed white stiff hairs; inner phyllaries similar, but with narrow scarious margins; ray florets c. 3 mm; disc florets c. 2 mm; achenes 2.5-3 x 1 mm, obconical, truncate, tuberculate, with a few minute teeth, brownish-black; pappus of 2 bristles 0.4 mm, deciduous.

N, O, M; canal banks, edges of springs, wells, swamps. Native to tropical and warm temperate America, naturalized in the Old World.

NOTE: The plant is green, turning blackish on drying; widespread, especially in the Nile region and the oases.

### 53. *Blainvillea* Cass.

Literature: Koster, J. T. & W. R. Philipson. 1950. Nomenclatural changes in *Spilanthes* and *Blainvillea* with remarks and a key to the species of *Spilanthes* in the Malay Archipelago. *Blumea* 6(2): 349-354.

Annuals; leaves simple, opposite or alternate; capitula in leafy dichotomous cymes or lax panicles, radiate or almost disciform; phyllaries 2-5-seriate; ray florets in 1-2 rows, female, minutely 2- to 3-lobed; corollas yellow or white; ray achenes 2- to 3-angled, compressed; disc achenes obpyramidal, 2- to 4-angled, usually compressed; pappus of 2-5 awns, often unequal, shortly connate at the base. About 3 species, pantropical.

#### 1. *Blainvillea acmella* (L.) Philipson, *Blumea* 6: 350 (1950).

Syns. *Verbesina acmella* L., *Sp. Pl.*, ed. 1, 901 (1753).

*Spilanthes acmella* (L.) Murr., *Syst. Veg.*, ed. 13, 610 (1774).

*Pyrethrum acmella* (L.) Medic., *Hist. Comentar. Acad. Elect. Sci.*

*Theod.-Palat.* 3: 243, t. 19 (1775).

*Eclipta latifolia* L.f., *Suppl. Pl.* 378 (1781).

*Bidens acmella* (L.) Lam., *Encycl.* 1: 415 (1783).

*Spilanthes mellisifolia* Salisb., *Prodr.* 186 (1796), nom. superfl., based on *V. acmella*

*Acmella mauritiana* L. C. Rich. in Pers., *Syn. Pl.* 2: 472 (1807), nom. superfl., based on *V. acmella*

*Verbesina lanceolata* Poir., *Encycl.* 8: 460 (1808).

*Acmella linnaei* Cass., *Dict. Sci. Nat.* 24: 330 (1822), nom. superfl., based on *V. acmella*

*Blainvillea rhomboidea* Cass., *Dict. Sci. Nat.* 29: 494 (1823).

*Blainvillea gayana* Cass., *Dict. Sci. Nat.* 47: 90 (1827).

*Blainvillea latifolia* (L.f.) DC. ex Wight, *Contr. Bot. Ind.* 17 (1834).

*Blainvillea rhomboidea* Cass. var. *lanceolata* (Poir.) DC., *Prodr.* 5: 492 (1836).

*Spilanthes mauritiana* (L. C. Rich.) DC., *Prodr.* 5: 625 (1836).

*Oligogyne burchellii* Hook.f., *Icones Pl.* 2, t. 101 (1837).

*Blainvillea polycephala* Gardner, *London J. Bot.* 7: 89 (1848).

*Blainvillea racemosa* Gardner, *London J. Bot.* 7: 89 (1848).

*Blainvillea hispida* Edgew., *Trans. Linn. Soc. London* 20: 70 (1851).

*Blainvillea alba* Edgew., *Trans. Linn. Soc. London* 20: 70 (1851).

*Calyptocarpus burchellii* (Hook.) Sch. Bip., *Bot. Zeitung* 24: 165 (1866).

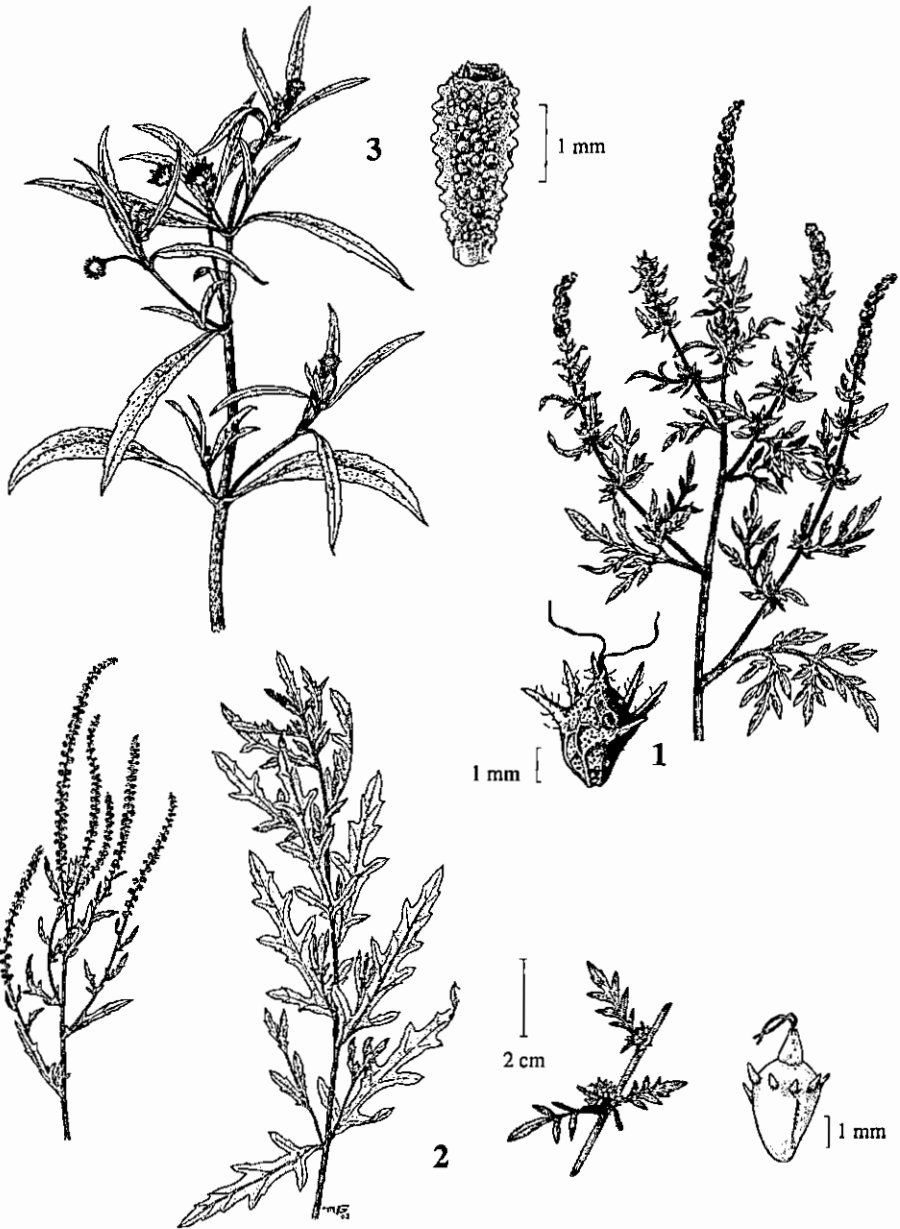


Plate 56. COMPOSITAE: *Ambrosia maritima* 1, flowering and fruiting branch; fruiting involucre enclosing the achene (down left). *Ambrosia artemisiifolia* 2, left to right: male flowering branch; vegetative branch, female fruiting branchlet; fruiting involucre enclosing the achene. *Eclipta prostrata* 3, flowering and fruiting branch; achene (up right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary, female fruiting branchlet and its fruiting involucre drawn by Margaret Tebbs.

1. **Ambrosia maritima** L., Sp. Pl., ed. 1, 988 (1753).

Aromatic, grey villose-canescens annual or short-lived perennial, 20-60(-80) cm; leaves 2-6 x 1-2.5 cm, 1-2-pinnatisect, the lobes oblong-ovate; staminate capitula 2.5-3 mm diam., sessile in nodding dense spicate inflorescences 2-6 cm; florets 8-20; corollas 3 mm, tubular, yellow, pubescent outside; anthers 1-1.5 mm, with a conspicuous appendage; pistillate capitula axillary, greenish; involucre reticulate-nerved, tuberculate; fruiting involucre 4-5 x 3-3.5 mm, accrescent, ovoid, tapering to a 1 mm beak and 5-7 horn-like appendages around the middle; achenes 3-3.5 x 2-2.5 mm, subglobose to ovoid, epappose, firmly enclosed by the involucre.

N, O, M; Nile and canal banks, moist ground. Mediterranean region.

NOTE: The plant is used in folk medicine to expel kidney stones (for more details see Boulos 1983).

2. **Ambrosia artemisiifolia** L., Sp. Pl., ed. 1, 988 (1753).

Green hirsute annual 30-80 cm, not aromatic, with bulbous-based hairs; stems much branched, sulcate; leaves 3-8 x 1-3.5 cm, opposite or alternate, ovate-lanceolate to obovate in outline, pinnatifid to pinnatipartite; lobes 0.2-1.2 x 0.1-0.4 cm, deltoid, lanceolate or oblong-linear, acute; male capitula 2-2.5 mm diam., in  $\pm$  lax racemose inflorescences 8-14 cm; florets 5-8 per capitulum; involucre 1.5-2 x 3 mm, saucer-shaped; phyllaries connate, sparsely hairy, 5-6-lobed; lobes deltoid, obtuse; female capitula sessile, 2-4 in small clusters in the upper leaf-axils; fruiting involucre 3-3.5 x 2-3 mm, with a terminal beak surrounded by short spines.

M; weed of cultivation, waste ground. Native to North and Central America, naturalized in many tropical and temperate regions of the world.

NOTE: This is the first record of *Ambrosia artemisiifolia* in Egypt, collected from Burg El-Arab, c. 50 km west of Alexandria, 29 September 2001, Boulos 19503 & El-Gharib (K; Herb. Boulos, Cairo). The plant is badly infesting orchards. A local farmer stated that the plant was introduced some 10 years ago and is becoming increasingly widespread locally.

52. **Eclipta** L., nom. conserv.

Annuals or herbaceous perennials; leaves simple, opposite; capitula in lax panicles, radiate; phyllaries 2-seriate, equal or the outer larger; receptacle with bristle-like paleae; ray florets numerous, female, small and narrow, minutely 2-lobed or entire, white or yellowish; achenes obovate, elliptic or obconical; ray achenes trigonous; disc achenes laterally compressed; pappus absent or of few short teeth. 4 species, pantropical.

1. **Eclipta prostrata** (L.) L., Mant. Alt. 286 (1771).

Syns. *Verbesina prostrata* L., Sp. Pl., ed. 1, 902 (1753).

*Verbesina alba* L., Sp. Pl., ed. 1, 902 (1753).

*Eclipta alba* (L.) Hassk., Pl. Jav. Rar. 528 (1848).

*Eclipta marginata* Hochst. & Steud. ex Boiss., Fl. Orient. 3: 249 (1875).

Hispid annual 20-60 cm, covered with appressed white rigid hairs with bulbous base;

N, M, S; weed of waste ground, roadsides, edges of cultivation. Cosmopolitan.

2. **Xanthium strumarium** L., Sp. Pl., ed. 1, 987 (1753).

Syns. *Xanthium indicum* König ex Roxb., Hort. Beng. 67 (1814).

*Xanthium italicum* Moretti in Brugnati., Giorn. Fis., ser. 2, 5: 326 (1822).

*Xanthium brasiliicum* Vellozo, Fl. Flum. 399 (1825).

*Xanthium cavanillesii* Schouw, Ann. Sci. Nat., sér. 3, 12: 357 (1849).

*Xanthium strumarium* L. subsp. *cavanillesii* (Schouw) D. Löve & Dansereau, Canad. J. Bot. 37: 205 (1959).

*Xanthium strumarium* L. subsp. *italium* (Moretti) D. Löve, Bot. J. Linn. Soc. 71: 271 (1976).

Scabrid-tomentose annual, 30-80 cm, with appressed minute short white hairs; stems branched, tomentose, later glabrescent, unarmed; leaves 4-8(-12) x 3-6(-8) cm, deltate, irregularly lobed, scabrid, the margins dentate-crenate, the base cordate or cuneate; petiole 3-8 cm, pubescent; male capitula in axillary and terminal racemes, pedunculate; fruiting involucre 1-1.2 x 0.8-1 cm, subglobose, tomentose-hispid, armed with hooked spines; beak 2-3 mm, of 2 slightly incurved pubescent rigid spines.

N, O, M, S; waste ground, edges of cultivation. Native to the New World, naturalized in the Old World.

NOTE: *Xanthium strumarium*, a polyploid ruderal, is a most variable species as regards habit, tomentum, leaf shape and size, and fruiting involucre, which has led to the description of several species and infraspecific taxa throughout its range. It is very difficult to classify the Egyptian plants under two distinct species (Täckholm, Stud. Fl. Egypt, ed. 2, 1974) or even two subspecies (Boulos, Fl. Egypt Checklist 157, 1995). In this treatment, only *X. strumarium* is recognized. Kupicha in Davis (ed.), Fl. Turkey 5: 49 (1975) stated that the specimens from Iraq and Egypt are intermediate between *X. strumarium* subsp. *strumarium* and subsp. *cavanillesii*. She added "it is doubtful whether the present taxonomy is valid for this difficult species throughout its entire range."

51. **Ambrosia** L.

Syn. *Franseria* Cav.

Literature: Payne, W. W. 1964. A re-evaluation of the genus *Ambrosia* (Compositae). J. Arnold Arbor. 45: 401-439.

Annuals, perennials or shrubs, usually aromatic; leaves alternate or opposite, entire, lobed or dissected, glandular; female capitula in axillary clusters below the male; phyllaries of pistillate capitula fused to form a spiny conceptacle, those of staminate capitula connate; receptacle in staminate capitula conical, paleate; pistillate florets without corolla; style-branches exerted from 2 small beaks of the conceptacle; male florets several, (4-)5-lobed, hyaline; anthers free; achenes enclosed; pappus absent. 43 species, mainly North and South America, some widespread weeds.

1. Plant grey, villose-canescens, aromatic; leaves 1-2-pinnatisect; staminate capitula in ± dense spicate inflorescences 2-6 cm; florets 8-20 per capitulum 1. **A. maritima**

+ Plant green, hirsute, with bulbous-based hairs, not aromatic; leaves pinnatifid to pinnatipartite; staminate capitula in ± lax racemose inflorescences 8-14 cm;

florets 5-8 per capitulum

2. **A. artemisiifolia**



**Plate 55. COMPOSITAE:** *Xanthium spinosum* 1, fruiting branch; fruiting involucre (up). *Xanthium strumarium* 2, fruiting branch; flowering branchlet (left). *Blainivillea acmella* 3, flowering and fruiting branch; achene (down left). *Galinsoga parviflora* 4, flowering and fruiting branch; achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

O (Uweinat), M, De, R, S; Sahara, North Africa, Sinai, Palestine, Syria, Arabia, Iraq.

NOTE: The type of *Bupthalmum graveolens* was collected in Cairo ("Káhirae"), Egypt in 1762, Forsskál 1021 (C, lectotype, photo!). Wiklund (1987) recognized three subspecies in *Nauplius graveolens*, of which subsꝑ. *graveolens* occurs in Egypt.

2. **Nauplius aquaticus** (L.) Cass., Dict. Nat. 37: 273 (1825).

Syns. *Bupthalmum aquaticum* L., Sp. Pl., ed. 1., 903 (1753).

*Asteriscus aquaticus* (L.) Less., Syn. Gen. Comp. 210 (1832).

*Odontospermum aquaticum* (L.) Sch. Bip. in Webb & Berthel., Phyt.

Canar. 3(2): 232 (1844).

*Asteriscus citriodorus* Heldr. & Hal., Österr. Bot. Zeitschr. 45: 411 (1895).

Glandular pubescent-villose annual, 15-40 cm; stems dichotomously branched above, covered with villose hairs and minute glands; lower leaves 3-8 x 0.5-1.5 cm, oblanceolate or spatulate, entire, attenuate at the base, the apex obtuse, appressed-pubescent and glandular on both surfaces; upper leaves oblong, sessile, clasping; capitula 1-1.5 cm diam. (excluding outer phyllaries); involucre hygrochastic; outer phyllaries few, 1-2.8 x 0.3-0.6 cm, oblong-lanceolate, subacute, spreading, the inner numerous; ray florets 5-8 mm, pubescent dorsally; disc florets 2.5-3 mm, numerous; achenes 1.5-2 x 0.6-0.8 mm, silky; pappus 1-1.25 mm, with fimbriate-dentate scales.

N; marshy land, inundated plains. Portugal, Mediterranean region.

## 50. **Xanthium** L.

Literature: Löve, D. & Dansereau, P. 1959. Biosystematic studies in *Xanthium*. Canad. J. Botany 38: 173-208.

Monoecious annuals, often spiny; leaves alternate, petiolate, lobed or not; pistillate capitula axillary, subsessile; staminate capitula small, with free phyllaries; phyllaries in female capitula fused to an indurate subglobose or ellipsoid, spiny-hooked, internally 2-locular conceptacle; staminate capitula with free phyllaries; receptacle conical and paleate; female florets 2; corolla 0; style-branches protruding from the beaks of the conceptacle; male florets several, small; anthers free, blackened; filaments connate; achenes enclosed; fruiting involucre with hooked prickles; pappus absent. 3 species, warm regions of the world, noxious weeds.

1. Stems armed with 3-fid spines; leaves 1.5-3 cm, deeply 3-lobed, the margin entire; petiole 2-4 mm; fruiting involucre ellipsoid **1. X. spinosum**
- + Stems unarmed; leaves 4-10 cm, irregularly lobed, the margin dentate; petiole 3-8 cm; fruiting involucre subglobose **2. X. strumarium**

1. **Xanthium spinosum** L., Sp. Pl., ed. 1, 987 (1753).

Spiny pubescent annual 20-80 cm; stems erect, branched, hairy, later glabrescent; spines at the leaf base 1.5-3.5 cm, 3-fid, yellowish, glabrous; leaves 1.5-3 x 1-1.8 cm, undivided to deeply 3-lobed; petiole 2-5 mm, densely appressed white-hairy on the lower surface, dark green and sparsely hairy on the upper, except on the canescent veins; capitula solitary, borne near the leaf axils, sessile, the male at the ends of branches; fruiting involucre 0.8-1.2 x 0.5-0.8 cm (including the spines), ellipsoid, arachnoid, nodding; spines hooked; beak of 1-2 spines, or spines absent.



M, De, S; sandy and stony desert wadis and plains. Canary Islands, North Africa, Sinai, Palestine, Syria, Arabia, Iraq, Iran, Pakistan.

NOTE: The involucre of the dry capitula of *Asteriscus hierochunticus* open when moistened (hygrochastic), similar to the dry fruiting plants of *Anastatica hierochuntica* L. (Cruciferae), the "Rose of Jericho", which also opens and stretches its branches when moistened. Teppner, in *Phyton* 35: 79-82 (1995), introduced another point of view, based on some old texts, that the true "Rose of Jericho" is not *Anastatica hierochuntica* L. (Cruciferae), which has long been considered a symbol of resurrection, but it is indeed *Asteriscus hierochunticus* which is the "True Rose of Jericho".

#### 49. *Nauplius* Cass.

Syns. *Bubonium* Hill, *Asteriscus* Moench

Literature: Wiklund, A. 1987. The genus *Nauplius* (Asteraceae-Inuleae). *Nord. J. Bot.* 7: 1-23.

Greuter, W. 1997. Save *Asteriscus*, sink *Nauplius*. *Flora Mediterranea* 7: 41-48.

Annuals, perennials or low shrubs; leaves sessile, pubescent, sometimes fleshy, entire, dentate or lobed; capitula solitary, terminal, radiate; receptacle paleate; paleae folded and longitudinally crested with secretory cavities under the crest, pubescent; ray florets female, the epidermis crested; disc florets bisexual; corollas yellow; anthers long-calcarate, with short tails; achenes  $\pm$  triquetrous, with confluent sclerenchymatic tissue and chambered secretory cavities; pappus 1-2-seriate, of large, broad scales. 8 species, Cape Verde and Canary Islands, Portugal, Sahara, Mediterranean region, Sinai, Arabia, Iraq.

1. Low shrub; at least some leaves lobed, dentate or incised;  
involucre not hygrochastic; ray florets glabrous or very sparsely hairy  
(desert wadis, dry lands) 1. *N. graveolens*
2. Annual; all leaves entire, not lobed or incised; involucre hygrochastic;  
ray florets dorsally pubescent (moist ground, ditches) 2. *N. aquaticus*

#### 1. *Nauplius graveolens* (Forssk.) Wiklund, *Nord. J. Bot.* 7: 16 (1987) subsp. *graveolens*

Syns. *Bupththalmum graveolens* Forssk., *Fl. Aegypt.-Arab.* 151 (1775).

*Asteriscus graveolens* (Forssk.) Less., *Syn. Gen. Compos.* 210 (1832).

*Odontospermum graveolens* (Forssk.) Sch.Bip. in Webb & Berthel., *Phyt.*

*Canar.* 3(2): 232 (1844).

*Asteriscus schimperi* (Boiss.) Boiss., *Fl. Orient.* 3: 180 (1875).

For full synonymy and more details, see Wiklund (1987).

Aromatic pubescent low shrub, 30-60 cm; stems much-branched and divaricate, rigid, whitish; leaves 1.5-6.5 x 0.2-1.5(-2.5) cm, oblong-obovate to narrowly oblong-linear, lobed, dentate or incised, glandular-pubescent, the lower clasping, auriculate; capitula solitary; peduncle 0.2-1.2 cm, villous, becoming thick and stiff after anthesis; involucre campanulate; phyllaries 3-seriate, the outer few, 0.8-1.6 x 0.15-0.4 cm, linear, subacute, densely glandular-hairy, herbaceous; inner phyllaries numerous, 3-5.5 x 1-2.5 mm, oblong to oblong-ovate, subacute to obtuse, sparsely hairy and glandular, indurate after anthesis; receptacle convex; paleae 3-5 x 1-1.5 mm, oblong, stiff, the apex pubescent, the midrib glandular; ray florets spreading, the corollas glandular dorsally; disc florets numerous, the corollas glandular dorsally; achenes 1.5-2 x 0.5-0.8 mm, oblong-obovate, densely hispid; pappus 0.5-2 mm, of narrow scales with an acute apex.

achenes of disc florets  $\pm$  triquetrous, lacking secretary cavities; pappus of large scales, sometimes absent in ray achenes. 3 species, Europe, North Africa, southwest Asia.

1. Plant to 50 cm; stems erect, much-branched; capitula many;  
outer phyllaries spreading and star-shaped, acuminate, with spiny apex;  
ray florets 2-3-seriate 1. **A. spinosus**  
+ Plant dwarf,  $\pm$  stemless, with a single capitulum, or capitula few on diffusing  
branches under the primary capitulum; outer phyllaries not spreading or star-shaped,  
with obtuse or rounded apex; ray florets 1-seriate 2. **A. hierochunticus**

1. **Asteriscus spinosus** (L.) Sch.Bip. in Webb & Berthel., Phyt. Canar. 3(2): 230 (1844).

Syns. *Bupthalmum spinosum* L., Sp. Pl., ed. 1, 903 (1753).

*Pallenis spinosa* (L.) Cass., Dict. Sci. Nat. 37: 276 (1825).

For full synonymy see Wiklund (1985).

Annual (in Egypt) or short-lived perennial, 15-50 cm, pilose; stems erect, branched; leaves 2-12 x 0.5-2.5 cm, the lower oblong-spathulate, tapering to a petiole, obtuse; cauline leaves smaller, lanceolate to oblong-lanceolate, sessile, clasping and shortly auriculate at the base, the apex acuminate and spinescent; capitula many, single, on villose ebracteate peduncles (0.5-)2-8 cm; involucre broadly campanulate; phyllaries 3-4-seriate; the outer 1-3 x 0.2-0.5 cm, oblong-linear, acuminate, with spiny apex, apically spreading and star-shaped, rigid, keeled to canaliculate, 1-3 veined; inner phyllaries 4-8 x 1-3 mm, narrowly oblong, the apex rounded and cuspidate; receptacle flat; paleae oblong-linear, stiff, acute, glandular; ray florets 2-3-seriate; disc florets numerous; corollas yellow; achenes of ray florets 2.5-3 x 2 mm, compressed, winged; achenes of disc florets 1.2-2 x 0.5-1 mm, oblong-obovoid, ciliate; pappus 0.5-1 mm, of acute scales.

M, S; edges of cultivation, roadsides, waste ground. Canary Islands, Atlantic coasts of Portugal and France, Mediterranean region, Sinai, Iraq, Iran.

2. **Asteriscus hierochunticus** (Michon) Wiklund, Nord. J. Bot. 5: 307 (1985).

Syns. *Saulcya hierochuntica* Michon, Solution nouvelle Question Lieux saints 100 (1852).

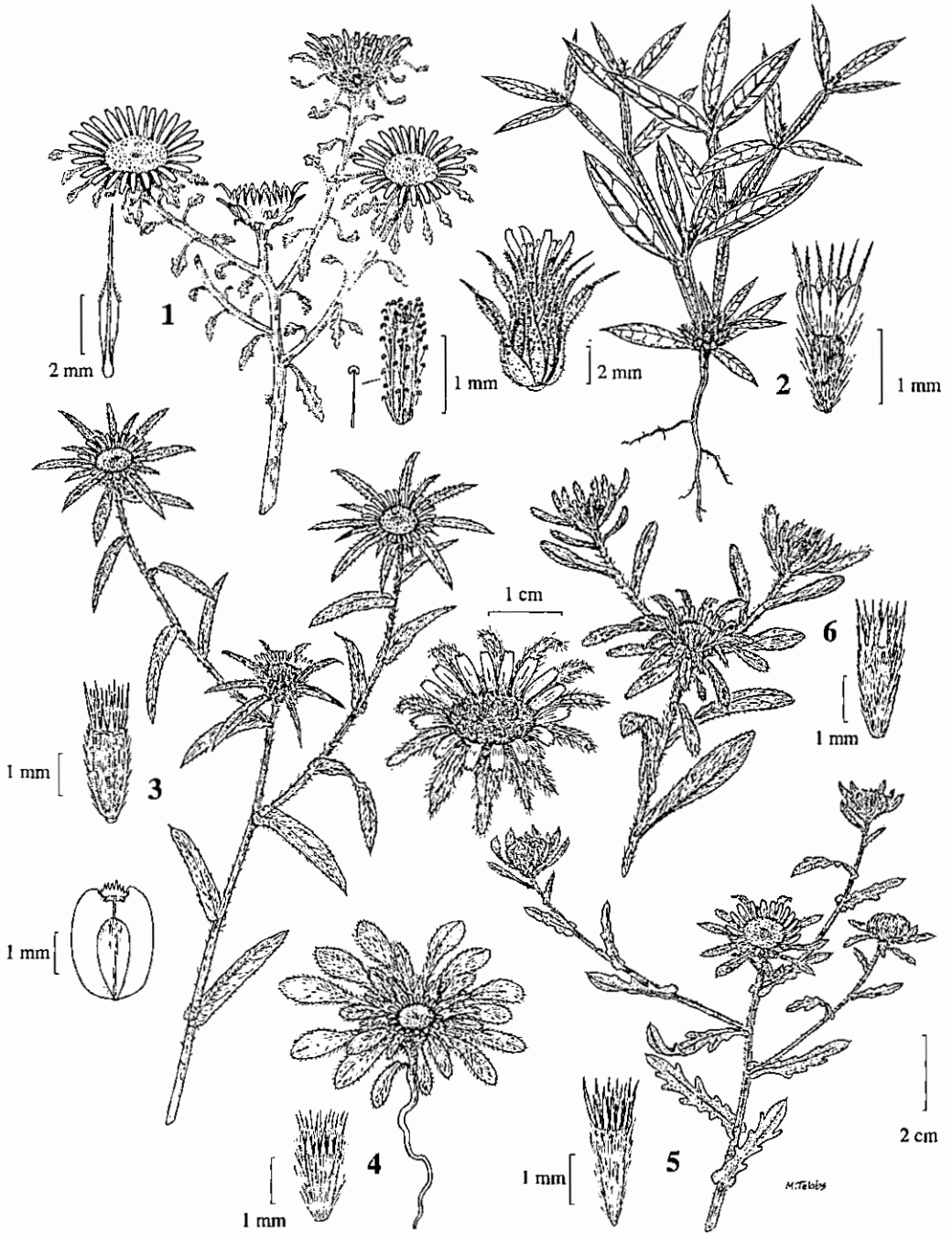
*Asteriscus aquaticus* (L.) Less. var. *pygmaeus* DC., Prodr. 6: 287 (1838).

*Asteriscus pygmaeus* (DC.) Coss. & Durieu in Balansa, Pl. d'Algérie 793 (1853).

*Odontospermum pygmaeum* (DC.) O. Hoffm in Engl. & Prantl, Natürl. Pflanzenfam. IV, 5: 209 (1890).

For more details about the nomenclature and synonymy, see Teppner, Phytion 35: 79-82 (1995).

Dwarf,  $\pm$  stemless, villose annual, with a single capitulum, or capitula few on diffuse branches under the primary capitulum; leaves 1.5-7.5 x 0.3-0.8 cm, spathulate to oblong-obovate, tapering to a petiole, mucronate; capitula sessile, overtopped by the upper leaves; involucre broadly campanulate, hygrochastic; phyllaries 1-2-seriate, the outer 1.2-2.5 x 0.2-0.4 cm, narrowly oblong-spathulate, flattened or folded, the apex obtuse or rounded, mucronate, the basal part indurate after anthesis; inner phyllaries 0.5-1.2 x 0.25-0.4 cm, lanceolate, mucronate, purplish inside; paleae 3-5 x 1-1.5 mm, oblong, acute, glandular; ray florets 1-seriate; corollas yellow; disc florets numerous; achenes of ray florets 1.2-1.5 x 0.6-1 mm, obconical, hairy, triquetrous; pappus 1-1.5 mm, of 6-8 cuspidate scales; achenes of disc florets 1.5-1.8 x 0.5-0.8 mm, subcylindrical, hairy; pappus similar to that of ray florets.



**Plate 54. COMPOSITAE:** *Anvillea garcinii* 1, flowering and fruiting branch; palea (left); achene and anchor-shaped hair (right). *Geigeria alata* 2, habit; capitulum (left); achene (right). *Asteriscus spinosus* 3, habit; disc achene (up left); ray achene (down left). *Asteriscus hierochunticus* 4, habit; achene (left). *Nauplius graveolens* 5, flowering and fruiting branch; achene (left). *Nauplius aquaticus* 6, flowering branch; capitulum (left); achene (right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

of *Anvillea garcinii*: subsp. *garcinii* and subsp. *radiata* (Coss. & Durieu) Anderb. The two subspecies, according to him, are separated on the presence or absence of ray florets: subsp. *garcinii* (usually discoid) and subsp. *radiata* (usually radiate). He added that in Central Saudi Arabia, subsp. *garcinii* sometimes possesses prominent ray florets, and plants from southern Algeria, southern Morocco, Egypt, Mauritania and Libya of subsp. *radiata* are sometimes discoid. He gave the distribution of both subspecies as follows: subsp. *garcinii* in the Middle East, and subsp. *radiata* in North Africa. In his distribution map, he did not set them apart, and Egypt, being a part of both North Africa and the Middle East, might therefore have both subspecies.

#### 47. *Geigeria* Griess.

Literature: Merxmüller, H. 1953. Compositen-Studien 3: Revision der Gattung *Geigeria* Griesselich. Mitt. Bot. München 1: 239-316.

Annuals or low shrubs; stems often conspicuously winged; leaves linear to lanceolate, sessile, sometimes decurrent; capitula radiate, sometimes discoid; receptacle with numerous bristles, epaleate; phyllaries broad, chartaceous, the outer often with leaf-like appendages; marginal florets, if present, female; disc florets bisexual; corollas yellow; anthers long-calcarate, with short tails; achenes ellipsoid, or obpyramidal, villous; pappus 2-3-seriate, of large scales, the inner often long and bristle-like. 27 species, Africa, but especially southern Africa.

1. *Geigeria alata* (DC.) Benth. & Hook. ex Oliv. & Hiern in Dyer, Fl. Trop. Afr. 3: 368 (1877).

Syns. *Diplostemma alatum* DC., Prodr. 7: 75 (1838).

*Geigeria macdougallii* S. Moore, J. Bot. 51: 268 (1913).

Glandular, sparsely hairy to glabrescent annual, 10-30 cm; stems branched, conspicuously 3-winged; wings 2-3 mm broad; leaves 1.5-5.5 x 0.4-1.2 cm, opposite, coriaceous, lanceolate to elliptic, thinly covered with short stiff hairs to glabrescent, with lustrous copper-coloured glands on both surfaces, mucronate, the margins ciliate; each node with 3 leaves, 2 with decurrent bases and 1 without; capitula 5-6 mm, campanulate, sessile in the forks of branches; phyllaries 2-3-seriate, oblong-ovate, spine-tipped, glandular, puberulent; receptacle with numerous slender bristles; florets 10-12 per capitulum; ray florets 1-seriate, ligulate; disc florets tubular; corollas yellow; achenes c. 1 x 0.5 mm, obpyramidal, villose; pappus c. 1 mm, of aristate, scarious scales.

GE; sandy soils. Southeast Egypt, Sudan, Eritrea, Ethiopia, Somalia, Kenya, Namibia, Angola, Cameroun, Niger, Mali, Mauritania, Arabia.

#### 48. *Asteriscus* Mill.

Syn. *Pallenis* Cass.

Literature: Wiklund, A. 1985. The genus *Asteriscus* (Asteraceae-Inuleae). Nord. J. Bot. 5: 299-314.

Annuals, perennials or low shrubs; leaves simple, entire, hairy; capitula solitary, radiate; receptacle smooth, paleate; palea scarious, subequal, keeled, glandular; involucre broadly campanulate to broadly cyathiform with subtending leaves; ray florets female, fertile; disc florets bisexual, apically constricted; corolla yellow; anthers long calcarate, with short tails; achenes of ray florets oblong-ovoid,  $\pm$  terete or compressed and winged;

branches usually very small; capitula solitary, numerous in lax terminal cymes; involucre 4-5 mm, pubescent; phyllaries 5-6-seriate, acuminate or cuspidate, ciliolate, with minute sessile glands; florets 2.5-3.5 mm, the ray florets  $\pm$  as long as the disc florets; corollas yellow; achenes 0.5-1.2 x 0.35 mm,  $\pm$  cylindrical, glabrous; pappus 2-2.5 mm, of 7-10 inner barbellate bristles, connate with an outer cupule at the base.

N, O, M, D, R, GE, S; desert wadis, sandy and alluvial plains, edges or reclaimed desert lands. Canary Islands, Mauritania, North Africa, Sinai, Palestine, Arabia, Iraq, Iran, Afghanistan, Pakistan, India, West tropical Africa, Sudan, Ethiopia, Eritrea, Somalia.

NOTE: The type of *Aster crispus* was collected in Egypt, at the Giza Pyramids, by Forsskål in 1762 (C). *Pulicaria undulata* is one of the most widespread desert plants in Egypt; its habit is most variable and usually reflects the moisture content of the soil where it grows. Pure stands with luxurious growth of cushion-shaped shrubs, covering vast areas of wadi beds or open desert plains, are often seen after a good rainy season.

#### 46. *Anvillea* DC. Syn. *Anvilleina* Maire

Literature: Anderberg, A. A. 1982. The genus *Anvillea* (Compositae). Nord. J. Bot. 2: 297-305.

Low shrubs; leaves narrowly lanceolate or spathulate, often irregularly dentate, pubescent; capitula solitary, radiate or discoid; involucre subglobose or broadly campanulate; outer phyllaries connate at the base and forming a hard hygrochastic cup; midveins of subtending leaves becoming spinose with age; receptacle strongly concave, smooth, paleate; paleae subtending the florets, folded at the base, with elongate appendage at the apex; ray florets sterile, often absent; disc florets bisexual; corollas yellow; anthers minutely calcarate, tailed; ray achenes flattened, subcordate, sterile; disc achenes quadrangular, inconspicuously ribbed, with anchor-shaped hairs; pappus absent. 2 species, North Africa, southwest Asia.

1. *Anvillea garcinii* (Burm.f.) DC., Prodr. 5: 487 (1836).

Syns. *Anthemis garcinii* Burm.f., Fl. Ind. 183, t. 60, f. 1 (1768).

*Bupthalmum arabicum* Delile, Fl. Arabie Pétrée 14, t. 4 (1830).

Greyish-woolly low shrub, 20-50 cm; stems many, branched; old branches rigid, intricate, covered with white peeling bark; leaves 0.5-1.2 x 0.2-0.3 cm, obovate-spathulate, irregularly dentate, or repand, tapering towards the base, clasping, auriculate, pubescent with immersed glands on both surfaces; capitula 1.5-2.5 cm diam. at anthesis, solitary, few, radiate or discoid; peduncle 2-5 mm, thick; involucre 1.2-1.8 cm, broadly campanulate; phyllaries 2-3-seriate, the outer connate and forming a hard cup, ending with flat leaf-like appendages 5-8 x 2-3 mm; inner phyllaries 10-25, 1-1.4 x 0.2-0.3 cm, 1-2-seriate, lanceolate, acuminate, pubescent, becoming spinescent by age; ray florets 15-25, 1.5-2.2 cm; disc florets numerous; corollas 5-8 mm, narrowed at the base; corollas yellow; achenes 1-1.5 x 0.3-0.4 mm, quadrangular, with anchor-shaped hairs; pappus absent.

Dw, S; stony and sandy wadis and desert alluvial plains. Mauritania, North Africa, Sinai, Palestine, Arabia, Iraq, Iran.

NOTE: In his revision of the genus *Anvillea*, Anderberg (1982) recognizes two subspecies

Viscid aromatic perennial 0.3-1.2(-2) m, with tubercle-based hairs; stems erect, branched, purplish; leaves 6-12(-15) x 0.3-1 cm, oblong- to linear-lanceolate, subacute to obtuse, the lower tapering at the base, the cauline clasping; capitula solitary, in lax terminal cymes; peduncle 2-6(-8) cm, bracteate; involucre 5-6 mm, subglobose, hairy; phyllaries 4-5-seriate, the outer 3-4 x 0.5 mm, linear-lanceolate, acute, the middle and inner 4-6 x 0.5 mm, linear, scarious-margined, acuminate; ray florets 4-6 mm; disc florets 4-4.5 mm; corollas yellow; achenes 1-1.2 x 0.3 mm, spindle-shaped, brownish, hairy; pappus of outer scales 0.3 mm, connate into a cupule, and inner 8-10 bristles 3 mm.

N, O, De, S; moist ground, around springs and canals. North Africa, Sinai, Palestine, Arabia, Niger, Chad, Eritrea, Ethiopia.

**6. *Pulicaria arabica* (L.) Cass., Dict. Sci. Nat. 44: 94 (1826) subsp. *arabica***

Syns. *Inula arabica* L., Mant. 114 (1767).

*Pulicaria trichocephala* DC., Prodr. 5: 478 (1836).

*Pulicaria elata* Boiss., Diagn. Pl. Orient., ser. 1, 2: 6 (1849).

*Pulicaria demissa* Boiss., Fl. Orient. 3: 205 (1875).

*Pulicaria laniceps* Bornm., Notizb. Bot. Gart. Berlin-Dahlem 7: 152 (1917).

Annual 40-80 cm; stems erect, much-branched; juvenile branches densely villose and glandular, later glabrescent; leaves 2-6 x 0.3-1 cm, oblong-linear to oblanceolate, entire, the base clasping and shortly auriculate, the apex acute to obtuse, pilose and glandular on both surfaces; capitula solitary, in open cymes; peduncle 0.5-3 cm, pilose, glandular; involucre 5-6 x 8 mm; phyllaries 4-seriate, pubescent, glandular, the outer 2.5-3 x 0.5 mm, linear-lanceolate, acuminate or cuspidate, green; middle and inner phyllaries 5-6 x 0.5 mm, linear, acuminate or cuspidate, scarious-margined, green along the midrib; ray florets 10-12, c. 6 mm; ray 3 mm; disc florets c. 4.5 mm; corolla-lobes acuminate, pubescent; achenes 1-1.5 x 0.3 mm, oblong-ellipsoid, setulose; pappus of outer short scales, connate at the base and forming a cupule, and 12-15 inner bristles 3.5-4 mm.

N, O, M, D, S; marshes, springs, swamps, moist ground, canal banks. Mauritania, Morocco, Algeria, Libya, Egypt, Palestine, Lebanon, Turkey, Aegean Islands, Cyprus, Arabia, Iraq, Afghanistan.

NOTE: According to Gamal-Eldin (1981), the Egyptian plants belong to subsp. *arabica*.

**7. *Pulicaria undulata* (L.) C. A. Mey., Verz. Pfl. Casp. Meer. 79 (1831) subsp. *undulata***

Syns. *Inula undulata* L., Mant. 115 (1767).

*Aster crispus* Forssk., Fl. Aegypt.-Arab. 150 (1775).

*Inula crispa* (Forssk.) Pers., Syn. Pl. 2: 450 (1807).

*Francoeuria crispa* (Forssk.) Cass., Dict. Sci. Nat. 34: 44 (1825).

*Pulicaria crispa* (Forssk.) Oliv. in Grant, Trans. Linn. Soc. London 29: 96 (1873).

*Francoeuria undulata* (L.) Lack in Rech. f., Fl. Iranica 145: 120 (1980).

Low shrub, often cushion-shaped, or perennial with woody base, 30-80 cm; stems numerous; juvenile branches densely white-appressed-woolly, later glabrescent; old branches reddish and divaricate; leaves 0.5-3(-4) x 0.2-0.8(-1.2) cm, oblong-linear, oblong-lanceolate or oblong, sessile, clasping at the base, the apex mucronate, the margin conspicuously undulate, first white-cobwebby, later glabrescent; leaves on flowering

setulose, brownish; pappus 3-4 mm, of inner 15-20 barbellate bristles dilated at the apex, and an outer cupule of short scales connate at the base.

Two subspecies occur in Egypt:

subsp. **incisa**

Phyllaries loosely imbricate, acute to acuminate, light-coloured at the apex; disc florets 7 mm.

De, R, GE, S; desert wadis. West tropical Africa, Chad, Egypt, Sudan, Eritrea, Ethiopia.

subsp. **candolleana** E. Gamal-Eldin, Phanerog. Monogr. 14: 166 (1981).

Syn. *Pulicaria desertorum* DC. in Decne., Ann. Sci. Bot., sér. 2, 2: 263 (1834).

Phyllaries densely imbricate, all with a dark, acuminate almost aristate apex; disc florets 5 mm.

De, S; desert wadis. Mauritania, Algeria, Libya, Egypt, Sudan, Arabia.

4. ***Pulicaria vulgaris*** Gaertn., Fruct. Sem. Pl. 2: 461, t. 173, f. 7 (1791).

Syns. *Inula pulicaria* L., Sp. Pl., ed. 1, 882 (1753).

*Pulicaria pratensis* Scheele, Linnaea 18: 460 (1844).

Greyish-woolly glandular annual, 10-40 cm; stems erect or spreading, much branched; lower leaves 1.5-3 x 0.5-1.5 cm, sessile, slightly clasping at the base, entire, obovate, the apex acute; upper leaves 0.5-1 x 0.1-0.3 cm, oblanceolate or elliptic; capitula numerous, solitary; peduncle 0.2-1.5 cm, woolly-pubescent, eglandular; involucre 3.5-4 x 8 mm; phyllaries 4-5-seriate, densely hairy, the outer 2 x 0.25 mm, oblanceolate, acute, the inner 3-4 x 0.4 mm, linear, acuminate; ray florets 1-seriate; ray limb 1-2 mm; disc florets numerous; corollas 2 mm, yellow; corolla-lobes strongly pubescent and glandular-punctate; achenes 1.2-1.5 mm, ellipsoid, angular; pappus 1.5 mm, of outer short scales and inner 6-8 bristles.

N; moist ground, Nile and canal banks. Europe, North Africa, southwest to Central Asia.

NOTE: We have not seen any authentically identified specimens of this species from Egypt, and the above description is based on material from Syria and Turkey. According to Gamal-Eldin, Phanerog. Monogr. 14: 18 (1981), *Pulicaria vulgaris* is restricted in Africa to the western Mediterranean region of North Africa, in Morocco and Algeria. She cites no specimens from Egypt or Sudan. Grierson in Davis (ed.), Fl. Turkey 5: 75-76 (1975) gives the following distribution for *P. vulgaris*: "Europe (Britain to C. Russia), N. Africa, S.W. & C. Asia, N.W. India. Euro-Sib. element?", which eliminates Sudan from the area of the species. Its occurrence in Egypt remains to be confirmed by acquiring new collections.

5. ***Pulicaria inuloides*** (Poir.) DC., Prodr. 5: 480 (1836).

Syns. *Erigeron inuloides* Poir., Encycl. Suppl. 5: 464 91817).

*Pulicaria longifolia* Boiss., Diagn. Pl. Orient., ser. 2, 3: 16 (1856).

*Pulicaria aspera* Pomel, Nouv. Mat. Fl. Atlant. 35 (1874).

1. **Pulicaria petiolaris** Jaub. & Spach, Ill. Pl. Orient. 4: 69, t. 344 (1852).

Syn. *Pulicaria chrysopsidoides* Schweinf., Beitr. Fl. Aethiop. 153 (1867),  
nom. nud.

Glandular-puberulent perennial 20-50 cm, sometimes flowering in the first year; stems branched, sulcate; leaves 1.5-5 x 0.8-2 cm; lamina broadly ovate, lanceolate or elliptic, dentate, cuneate at the base into a narrowly-winged petiole 1-2.5 cm; capitula solitary, few, in terminal lax corymbs; peduncle 1.5-6 cm, bracteate, slender, glandular-hairy; involucre 5-6 mm; phyllaries 3-4-seriate, the outer 1.5-2 x 0.25 mm, linear-lanceolate, glandular-hairy; middle phyllaries 4-5 x 0.5 mm, linear, acuminate, the margins scarious, glandular-hairy at the midrib; inner phyllaries 5-6 x 0.5 mm, linear, acuminate, with a green midrib, otherwise scarious; ray florets 5-8 mm, female; disc florets bisexual; corollas yellow; achenes 1.2-1.5 x 0.25 mm, spindle-shaped, hairy; pappus 3-4 mm.

GE; stony ground. Southeast Egypt, Sudan, Ethiopia, Eritrea, Somalia, Djibouti, southwest Arabia.

2. **Pulicaria sicula** (L.) Moris, Fl. Sard. 2: 363 (1840-1843).

Syns. *Erigeron siculum* L., Sp. Pl., ed. 1, 864 (1753).

*Jasonia discoides* Cass., Dict. Sci. Nat. 24: 201 (1822).

*Jasonia sicula* (L.) DC., Ann. Sci. Nat. Bot., sér. 2, 2: 261 (1834).

Hispid annual 20-40 cm; stems erect, branched, sulcate, brownish-red; lower leaves 1-2 x 0.2-0.3 cm, oblong-lanceolate, sessile, slightly clasping, obscurely denticulate, upper leaves smaller, short-linear, 1-2 mm broad, strongly revolute, the apex subacute; capitula solitary, few; peduncle to 6 cm, bracteate; involucre 4-4.5 mm, pubescent; phyllaries 3-4-seriate, the outer 1-2 x 0.4 mm, oblong-linear, acute, herbaceous; middle phyllaries 3-4 x 0.5 mm, scarious-margined, acute; inner phyllaries 4-4.5 x 0.5 mm, scarious except for the green midrib, acute; ray florets 1-seriate; ray limb 1 mm; disc florets 3 mm; achenes c. 1.5 x 0.3 mm, setulose; pappus 3.5 mm, of 20-30 inner bristles and outer short scales connate at the base.

N; moist ground. Morocco, Algeria, Tunisia, Egypt.

NOTE: This species is known from a few localities in the Nile delta of Egypt, but has not been collected since 1910.

3. **Pulicaria incisa** (Lam.) DC., Prodr. 5: 479 (1836).

Syns. *Inula incisa* Lam., Encycl. 3: 256 (1789).

*Inula undulata* sensu Delile, Descr. Egypte, Hist. Nat. 270, t. 46, f. 1  
(1814), non L. (1767).

*Pulicaria undulata* sensu Boiss., Fl. Orient. 3: 202 (1875).

Woolly-tomentose annual or short-lived perennial, 10-40 cm; stems erect, branched mainly from the base; cauline leaves 1-4 x 0.3-1.2 cm, oblong, strongly undulate, dentate or incised, clasping and auriculate at the base; radical leaves narrowed at the base; capitula 1.8-2.5 cm diam. at anthesis, solitary or few together, in open cymose inflorescences; involucre 4-7 mm, pubescent; phyllaries 4-5-seriate, loosely or densely imbricate, the outer lanceolate, the middle and inner linear-lanceolate, the apex acute or acuminate to almost aristate, light or dark-coloured; ray florets 0.6-1.2 cm, 1-seriate, numerous, conspicuous; disc florets 5-7 mm; corollas yellow; achenes 1-1.5 x 0.3 mm,



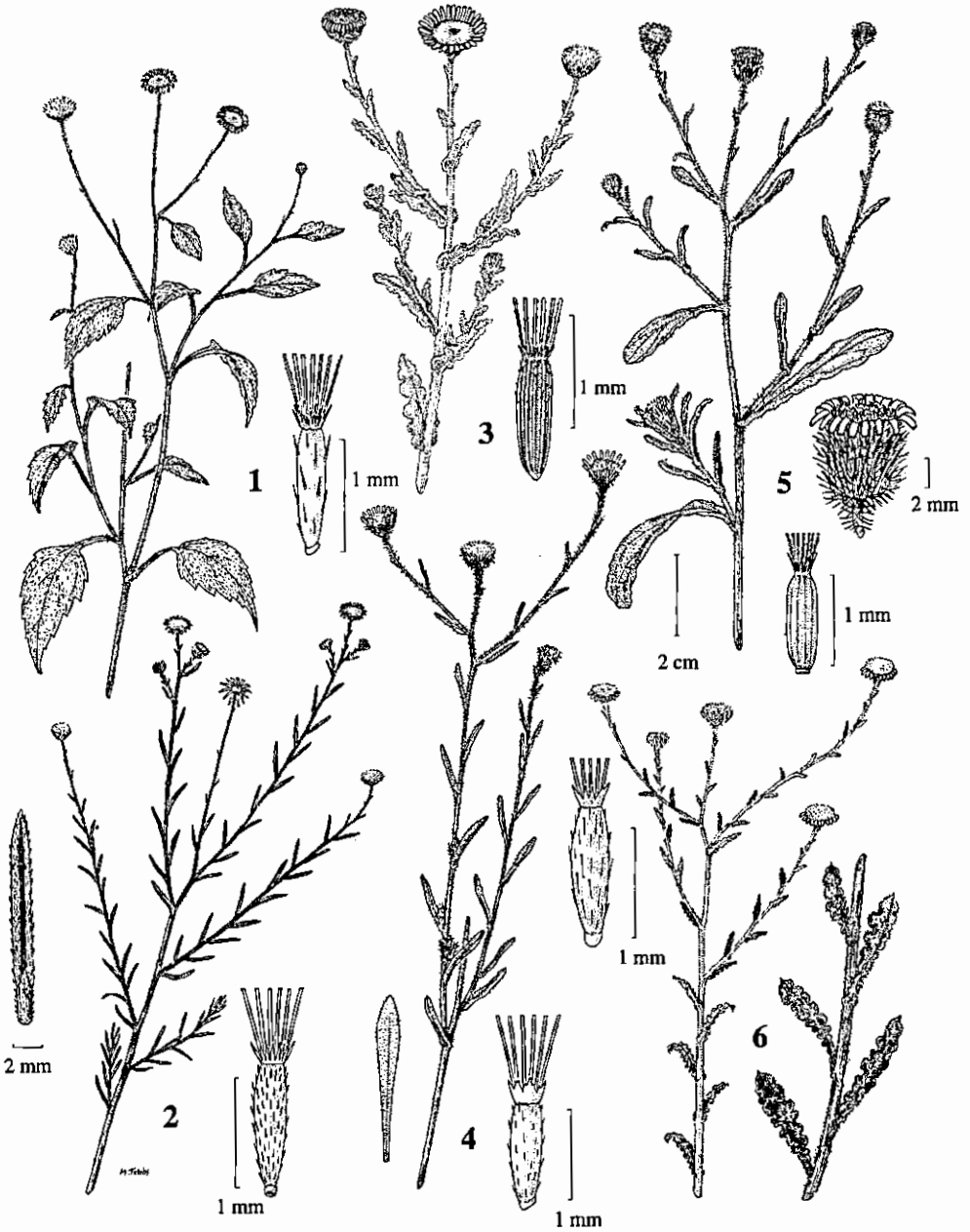


Plate 53. COMPOSITAE: flowering and fruiting branches of: *Pulicaria petiolaris* 1; achene (right). *Pulicaria sicula* 2; achene (down right); leaf (left). *Pulicaria incisa* 3; achene (down right). *Pulicaria inuloides* 4, achene (down right); basal leaf (down left). *Pulicaria arabica* 5; flowering capitulum and achene (down right). *Pulicaria undulata* subsp. *undulata* 6; basal leafy branchlet (right); achene (up left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

3. **Chiliadenus iphionoides** (Boiss. & Blanche) Brullo, *Webbia* 34: 301 (1979).  
 Syns. *Varthemia iphionoides* Boiss. & Blanche in Boiss., *Diagn. Pl. Orient*, ser. 2, 3: 9 (1856).  
*Jasonia iphionoides* (Boiss. & Blanche) Botsch., *Novosti Sist. Vyss. Rast.* 1964: 365 (1964).

Aromatic, glandular-tomentose and villose low shrub, 30-60 cm; stems much-branched; leaves 4-8 x 2-4 mm, oblong, sessile, slightly clasping, the margins revolute, the apex obtuse, densely tomentose-villose and glandular on both surfaces, the midrib prominent on the lower surface; capitula numerous, solitary or few together, in lax paniculate inflorescences to 40 cm; peduncle 0.2-1.5 cm, bracteate; involucre 7-8 mm, campanulate; phyllaries 3-4-seriate, loosely imbricate, silky-tomentose, oblong, obtuse, the outer greenish at the apex, the inner scarious; corollas yellow; achenes c. 3 x 0.6 mm, densely hairy; pappus 6 mm, of reddish bristles.

S (Mitla Pass); rocky ground. Sinai, Palestine, Lebanon, northwest Saudi Arabia.

#### 45. **Pulicaria** Gaertn.

Syns. *Francoeuria* Cass., *Platychaete* Boiss.

Literature: Gamal-Eldin, E. 1981. Revision der Gattung *Pulicaria* (Compositae-Inuleae) für Afrika, Makaronesien und Arabien. *Phanerog. Monogr.* 14. Vadúz: J. Cramer.  
 Hind, D. J. N. & Boulos, L. 2002. Four new combinations in *Pulicaria* (Compositae: Inuleae). *Kew Bull.* 57: 495-498.

Shrubs, perennials or annuals; leaves alternate, simple, sessile, rarely petiolate, often clasping and auriculate at the base, entire or variously incised, hairy; capitula radiate, disciform or discoid, solitary, few together or in clusters; involucre subglobose; receptacle honeycombed; ray florets 1-2-seriate, female, fertile; disc florets bisexual; corollas yellow; anthers with branched tails; achenes ellipsoid, often apically constricted and glandular, usually hairy; pappus of an outer cupule of short connate scales and an inner series of much longer barbellate, sometimes flattened bristles. About 80 species, Europe, Africa, Asia.

- |   |                         |
|---|-------------------------|
| 1. Leaves petiolate   | <b>1. P. petiolaris</b> |
| + Leaves sessile  | 2                       |
| 2. Leaves of flowering shoots 1-2 mm broad, strongly revolute | <b>2. P. sicula</b>     |
| + Leaves broader, not revolute                                | 3                       |
| 3. Leaves undulate  | 4                       |
| + Leaves plain, not undulate                                  | 5                       |
| 4. Ray florets conspicuous                                    | <b>3. P. incisa</b>     |
| + Ray florets small or inconspicuous                          | <b>7. P. undulata</b>   |
| 5. At least some leaves 6-12 cm; hairs tubercle-based         | <b>5. P. inuloides</b>  |
| + Leaves shorter; hairs not tubercle-based                    | 6                       |
| 6. Peduncle woolly-pubescent, eglandular; ray limb 1 mm       | <b>4. P. vulgaris</b>   |
| + Peduncle pilose, glandular; ray limb 3 mm                   | <b>6. P. arabica</b>    |

Annual or short-lived perennial, 10-40 cm; taproot thickened; leaves lyrate, the uppermost oblong-lanceolate, surrounding the capitula; involucre 1.5-2 x 1-1.4 cm, subglobose; phyllaries with a characteristic narrow membranous black border, terminating in a 3 mm spinule and small yellowish ciliolate appendages; corolla rose-purple; achenes 4 mm; pappus 2.5-3 mm, white.

NOTE: According to Wagenitz in Davis (ed.), Fl. Turkey 5: 509 (1975), this species is known from Portugal, Spain and northwest Africa, and is naturalized in southern France. He adds that the species is also known from Turkey, based on a single collection from Istanbul which he describes as probably adventive. He also considers its occurrence in Egypt doubtful. We have been unable so far to trace any material of this species collected from Egypt, and most probably its occurrence in the country was originally based on an adventive plant which was never recollected.

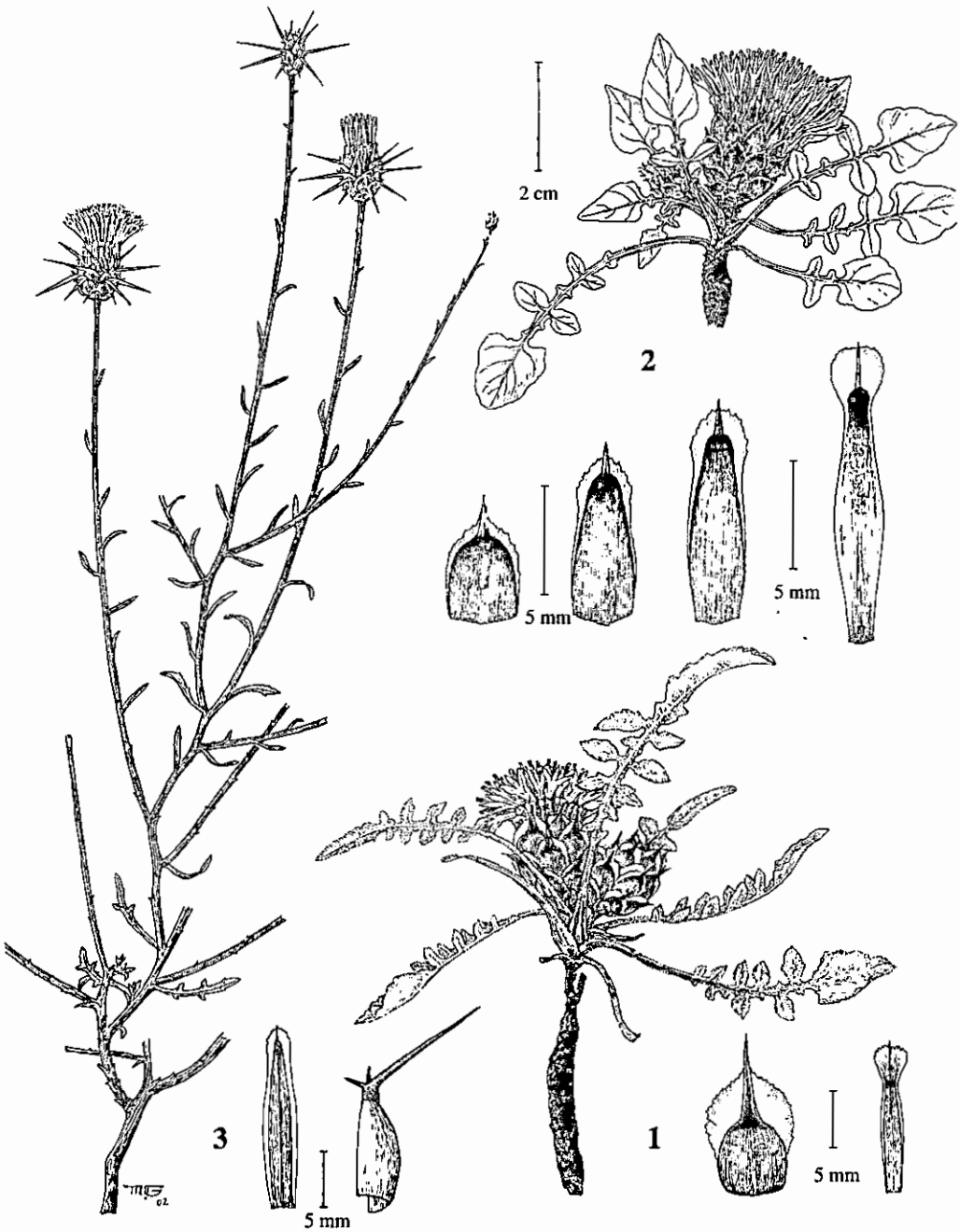
13. *Volutaria* Cass., nom. superfl. et illegit.  
Syns. *Cyanopsis* Cass.; *Amberboi* Adans., nom. rejic.

Literature: Wagenitz, G. 1989. The genus *Volutaria* Cass. in Europe. Comp. Newsl. 17: 7-9.  
Wagenitz, G. 1991. New taxa and new names in the genus *Volutaria* Cass. (Compositae).  
Candollea 46(2): 407-410.

NOTE: *Amberboa* (Pers.) Less. and *Volutaria* Cass. are viewed by us as two taxonomically distinct genera. The genus *Amberboa* does not occur in Egypt. However, we are using the name *Volutaria* for four Egyptian species. The generic name *Volutaria* is currently illegitimate and the only validly published name that can be used for these species is *Amberboi* Adans. We are proposing conservation of the illegitimate name, to stabilize the taxonomy of this genus; the formal proposal will be put to the Spermatophyta committee.

Unarmed annuals; stems branched; leaves undivided or pinnatifid to pinnatisect; capitula heterogamous, radiant; phyllaries multiseriate, imbricate; receptacle bearing smooth setae; marginal florets sterile, with spreading limbs; corolla tubular, of various colours; achenes pubescent, ribbed, slightly compressed, wrinkled; hilum lateral, near the base, bordered by a swollen margin; pappus of multiseriate scales, the outer narrow, the inner longer, broader and finely serrate at the apex. About 20 species, Canary Islands, Mediterranean region, southwest Asia, tropical East Africa.

- |  |   |
|--|---|
| 1. Corolla white, with pink lobes; pappus-scales purplish<br>+ Corolla variously coloured, not white; pappus-scales white or cream   | 1. <i>V. sinaica</i><br>2                       |
| 2. Cauline leaves not decurrent; outer and middle phyllaries black at the tips and margins, not spiny-tipped; corolla of marginal florets blue, of disc florets orange-yellow<br>+ Cauline leaves decurrent; outer and middle phyllaries spiny-tipped, the margins scarious, yellowish or brown; marginal and disc florets with blue or pink corolla | 4. <i>V. crupinoides</i><br>3                   |
| 3. Phyllaries with scarious or yellowish margins; spiny tip acute, yellowish; corolla blue, turning pink when dry<br>+ Phyllaries with brown margins; spiny tip acuminate, brown; corolla purplish-pink  | 2. <i>V. lippii</i><br>3. <i>V. tubuliflora</i> |
| 1. <i>Volutaria sinaica</i> (DC.) Wagenitz, Candollea 46: 409 (1991).<br>Syns. <i>Amberboa sinaica</i> DC., Prodr. 6: 559 (1838).  |   |



**Plate 42. COMPOSITAE:** *Centaurea pumilio* 1, habit; outer and inner phyllaries (down right). *Centaurea aegialophila* 2, habit; outer, median and inner phyllaries (down). *Centaurea scoparia* 3, inner and outer phyllaries (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

NOTE: The type of *Centaurea alexandrina* was collected in Alexandria, Egypt, "in incultis et ruderati Egypti ad Alexandrinum" by Delile.

15. ***Centaurea pumilio*** L., Cent. Pl. 1: 30 (1755).

Syn. *Aegialophila pumilio* (L.) Boiss., Diagn. Pl. Orient., ser. 1, 10: 105 (1849).

Perennial herb 5-12 cm; roots thick; stems dwarf, thick, branched; leaves 3-10 x 1-3 cm, appressed-cobwebby, canescent, pinnatisect or lyrate, the lowermost undivided, all petiolate, often overtopping the capitula; leaf-lobes oblong-ovate; capitula to 3 cm diam., broadly ovoid, sessile; phyllaries glabrous, the outer and middle 5-9 x 5-7 mm, suborbicular, with scarious margins 2-3 mm broad and a terminal spine 5-8 mm; appendages of inner phyllaries unarmed; corollas 2 cm, purple, pink or whitish; achene 4 x 1 mm, densely silky-hairy; pappus 3-4 times as long as the achene, white, the middle setae scabridulous.

M; maritime sand and limestone ridges. Libya, Egypt, Palestine, Syria.

16. ***Centaurea aegialophila*** Wagenitz, Notes Roy. Bot. Gard. Edinb. 33: 230 (1974).

Syns. *Aegialophila cretica* Boiss. & Heldr. in Boiss., Diagn. Pl. Orient., ser. 1, 10: 106 (1849).

*Centaurea cretica* (Boiss. & Heldr.) Nyman, Syll. 34 (1854), nom. illeg., non *Centaurea cretica* (L.) Spreng. (1826).

Like *Centaurea pumilio*, but leaves glabrescent; outer and middle phyllaries with scarious margins 0.5 mm broad and a terminal spine 2-3 mm; achenes 6 x 2 mm; pappus c. 1.2 cm, reddish at the base, the middle setae plumose.

M; maritime sands, limestone hillsides. Egypt, Palestine, Cyprus, Crete, southern Turkey.

17. ***Centaurea scoparia*** Sieber ex Spreng., Syst. Veg. 3: 402 (1826).

Syn. *Phaeopappus scoparius* (Sieber ex Spreng.) Boiss., Fl. Orient., 3: 602 (1875).

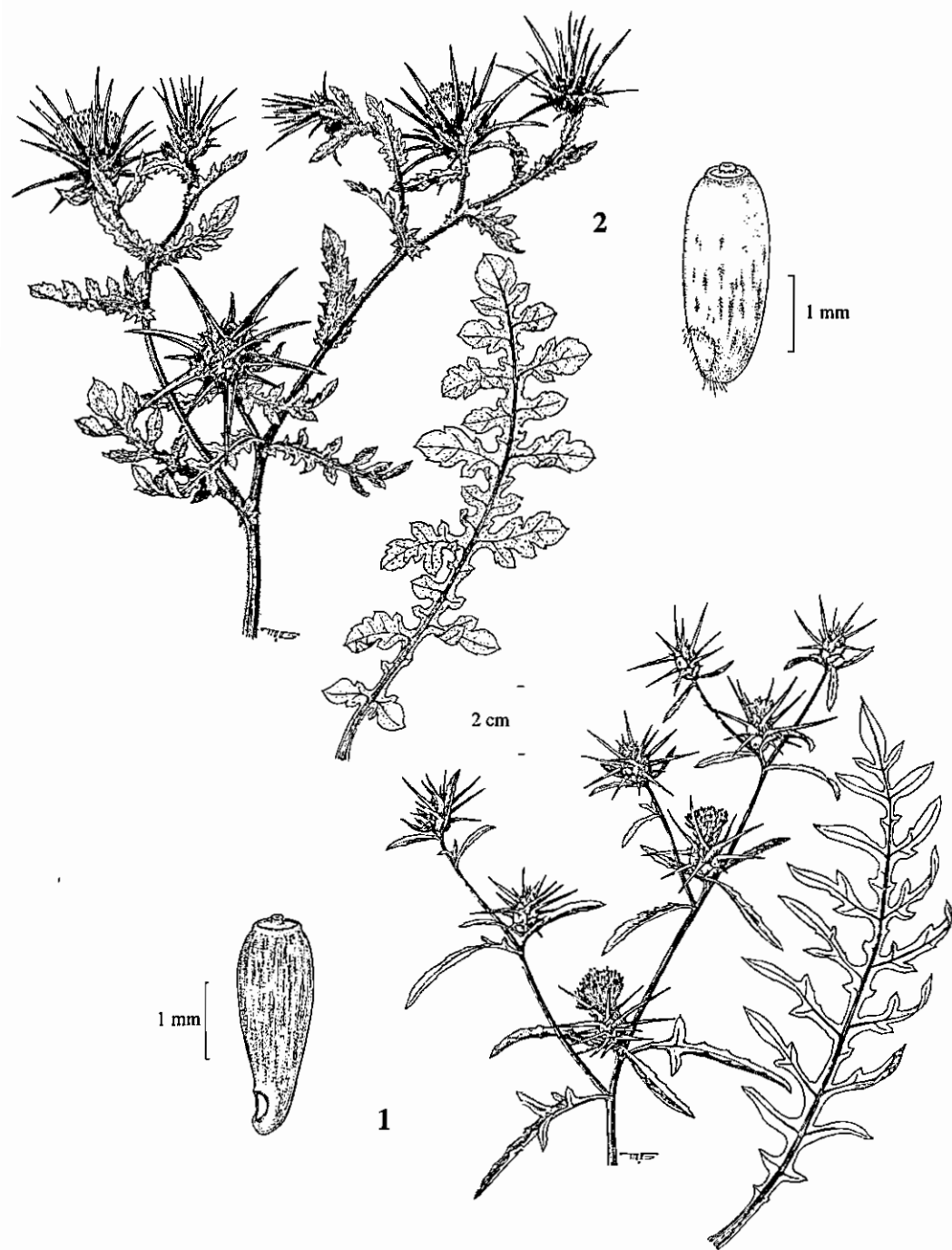
Low shrub 20-40 cm, pubescent to glabrescent; stems woody at the base, intricately branched; lower leaves to 4 cm, pinnatilobed; cauline leaves 1-2 x 0.1-0.2 cm, narrowly linear, entire or remotely denticulate, the uppermost smaller; capitula solitary on the tips of branches; involucre 1.2-1.5 cm, ovoid; outer phyllaries 3.5 x 4 mm, suborbicular, cobwebby at the margins, with 3-5 apical spinules; middle phyllaries 8 x 3 mm, lanceolate, ending in a spine 0.5-1.5 cm, with 2-4 basal spinules 1-2 mm, glabrous; inner phyllaries 1 x 0.2 mm, narrowly elliptic, the margins and apex scarious, glabrous, unarmed; corollas 1.6 cm, yellow; achenes 3.5 x 1 mm, truncate at the apex, glabrous, glossy; pappus 3-3.5 mm, multiseriate, of barbellate whitish bristles.

De, R, S; stony wadis. Egypt, Palestine, Arabia.

***Imperfectly known species:***

***Centaurea pullata*** L., Sp. Pl., ed. 1, 911 (1753).

Syn. *Melanoloma pullatum* (L.) Fourr., Ann. Soc. Linn. Lyon, n. s., 17: 96 (1869).



**Plate 41.** COMPOSITAE: *Centaurea calcitrapa* 1, flowering branch and basal leaf; achene (left). *Centaurea alexandrina* 2, flowering branch and basal leaf; achene (right). Drawn by Magdy El-Gohary, achenes drawn by Margaret Tebbs.

pinnatifid to pinnatisect, petiolate, the cauline sessile, lobed or not; capitula short-pedunculate or sessile, glabrous, subtended by small leaves; involucre 1-1.2 x 0.8-1.2 cm, broadly ovoid; phyllaries glabrous, leathery, narrowly scarious, ending in a yellow spreading spine to 2.5 cm, base of the spine 1-2 mm broad, with 2-5 pairs of spinules near the base; corollas 1-1.2 cm, pale yellow; achenes 2-2.5 x 1 mm; pappus c. 3 mm, of fine whitish bristles.

N, D, R, S; sandy deserts, roadsides, edges of cultivation. Egypt, Palestine, Lebanon, Syria, Arabia.

NOTE: Syntypes of *Centaurea pallescens* were collected in the desert between Cairo and Salheya, and from the Nile islands, Delile *s.n.* (MPU).

12. ***Centaurea procurrans*** Sieber ex Spreng., Syst. Veg. 3: 407 (1826).  
Syn. *Centaurea araneosa* Boiss., Diagn. Pl. Orient., ser. 1, 10: 121 (1849).

Annual or biennial 20-50 cm, densely covered with white crisped hairs; stems branched; basal leaves 2-6 x 0.5-1.5 cm, pinnatilobed, the lobes linear; cauline leaves 1-3 x 0.5-1 cm, lanceolate, dentate, not lobed, sessile, auriculate; capitula subsessile, densely cobwebby, subtended by small leaves; phyllaries leathery, cobwebby, terminated by a stout spine, the intermediate with a canaculate spine; spines 1-2.5 cm, with 2-3 pairs of spinules restricted to the base of the spine; corollas yellow; achenes c. 2.5 x 1.5 mm, glabrous; pappus 5-6 mm, of unequal bristles.

S; sandy coastal plains. Sinai, Palestine, Lebanon, Syria.

13. ***Centaurea calcitrapa*** L., Sp. Pl., ed. 1, 917 (1753).

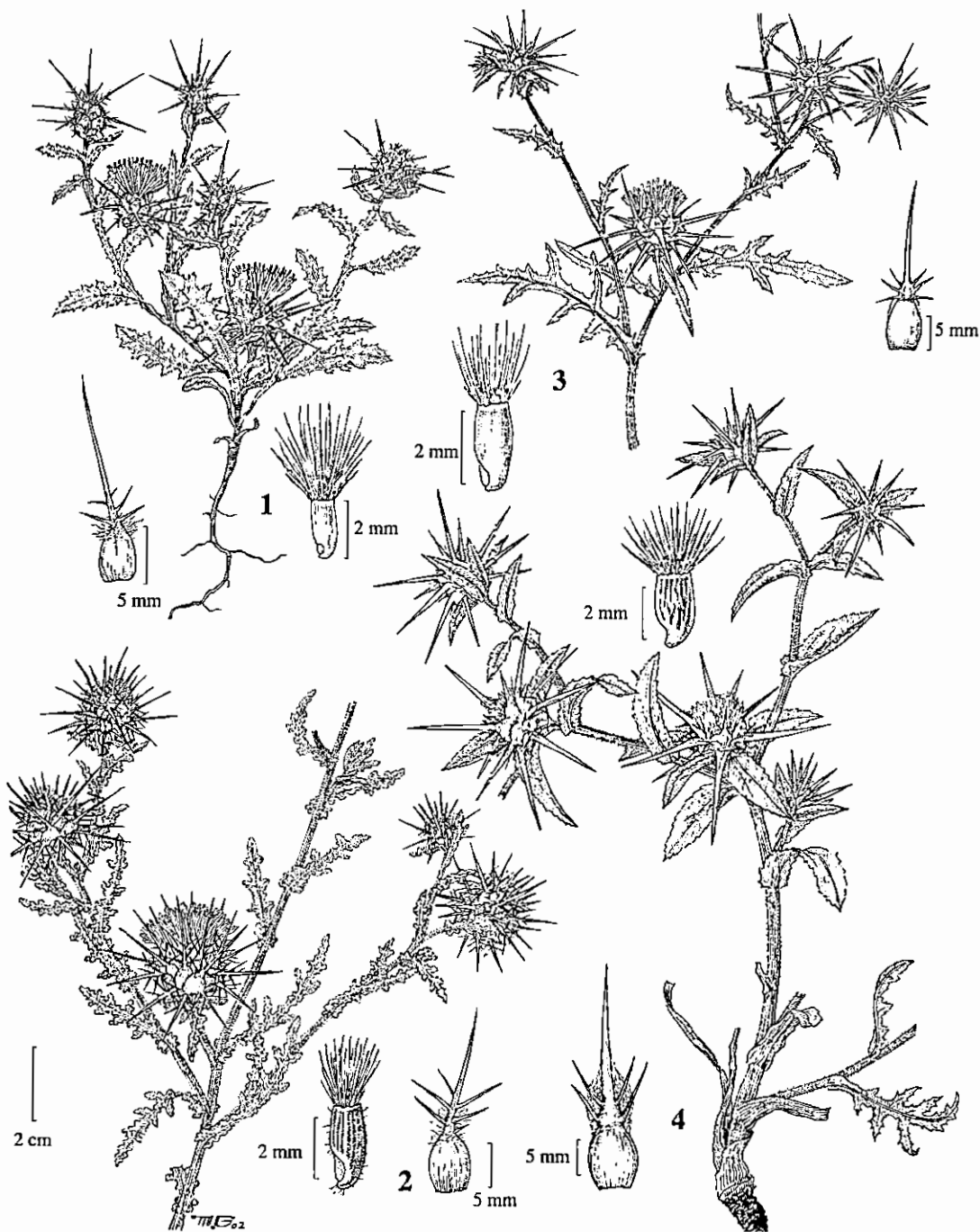
Annual or biennial, 20-60 cm; stems much-branched, sulcate, thinly pilose, glandular above; basal leaves 10-18 x 3-6 cm, pinnatisect, glandular-hairy, the lobes oblong-lanceolate, acute, remotely serrate or entire, short-petiolate; upper leaves sessile, smaller, with linear lobes; capitula solitary, subsessile or short-pedunculate, glabrous; involucre 1-2 x 0.6-1 cm, ovoid; phyllaries glabrous, yellowish, the outer 4-8 x 3-5 mm, ovate, ending in a spine to 3.2 cm, with 2-3 basal spinules 1-3 mm, the inner narrowly oblong; corollas 1.2-1.4 cm, mauve or white; achenes 2.8-3.2 x 1.25 mm, narrowly obconical, truncate at the apex, glabrous, lustrous, epappose.

N, O, M; widespread weedy species along canal banks, roadsides, waste land, edges of cultivation. Egypt, Syria, Lebanon, Cyprus, Turkey, Arabia, Iran.

14. ***Centaurea alexandrina*** Delile, Descr. Egypte, Hist. Nat. 280, t. 49, f. 3 (1814).

Canescent biennial 15-40 cm, with a thick fleshy rootstock; stems branched, sulcate; leaves 3-14 x 1-3 cm, pinnatifid to pinnatisect, the lobes dentate, mucronate; basal leaves petiolate, the cauline sessile, amplexicaul; capitula single or paired at the tips of branches; involucre 1.6-2 x 1.5-1.8 cm, broadly ovoid; outer and middle phyllaries 1.5-2 x 2 mm, broadly ovate, with spreading rigid spines to 4 cm; spines 5 mm broad, purplish at the base, with basal spinules 1-3 mm or toothed margins; inner phyllaries oblong-lanceolate to linear, spineless; corollas dirty yellow; anthers purple-brown; achenes 3-3.5 x 1-1.25 mm, ellipsoid-cylindrical, truncate at the apex, glabrous brownish, lustrous, epappose.

M; roadsides, edges of cultivation. Libya, Egypt.



**Plate 40. COMPOSITAE:** *Centaurea sinaica* 1, habit; achene (down right); phyllary (down left). *Centaurea aegyptiaca* 2, flowering and fruiting branch; achene and phyllary (down right). *Centaurea pallescens* 3, flowering and fruiting branch; achene (down left); phyllary (right). *Centaurea procurrens* 4, habit; phyllary (down left); achene (up within). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.



2-2.5 x 1 mm, cylindric-fusiform, dimorphic; the marginal epappose, the inner with pappus to 4 mm, of copious scabridulous bristles.

M, S; weed of cultivation. Europe, Mediterranean region, western Asia, North America.

8. *Centaurea melitensis* L., Sp. Pl., ed. 1, 917 (1753).

Like *Centaurea solstitialis*, but plant arachnoid-hairy; leaves green, the cauline remotely sinuate-lobed; capitula solitary or 2-3 together, sessile or short-pedunculate, subtended by 2-3 leaves; 1-2 sessile capitula usually borne just above the root; phyllaries with terminal spines 4-8 mm; achenes 2.5-3 x 1.25 mm; pappus 1.5-2 mm.

M; sandy soil. Canary Islands, North Africa, Malta, southern Europe.

NOTE: The occurrence of this species in Egypt is based on a single collection, J. R. Shabetai 86, from the area between Mersa Matruh and Sidi Barrani, 11 April 1932 (CAIM, K!). More material is desirable to learn more about its distribution in Egypt.

9. *Centaurea sinaica* DC., Prodr. 6: 592 (1838).

Cobwebby-canescens annual 10-30 cm; stems branched mainly from the base, winged; wings conspicuous, dentate; leaves 2-8 x 0.5-3 cm, oblong, the basal petiolate; cauline pinnatifid to pinnatipartite, sessile, decurrent, the lobes acute; capitula solitary, subtended by small leaves, short-pedunculate; involucre 1-1.5 cm, broadly ovoid, slightly cobwebby; phyllaries broadly ovate, terminated by a yellow spreading spine 1-2.2 cm, with several short spinules near the base; florets 1.5-1.8 cm, pink or yellow; achenes 1.5-2 x 1 mm, glabrous, glossy, hilum lateral; pappus 2.5 mm, brownish.

S; desert wadis. Sinai, Palestine, Lebanon, Syria, Arabia, Iraq.

NOTE: The type was collected from Sinai, Aucher-Eloy 9139 (isotype, K!).

10. *Centaurea aegyptiaca* L., Mant. 118 (1767).

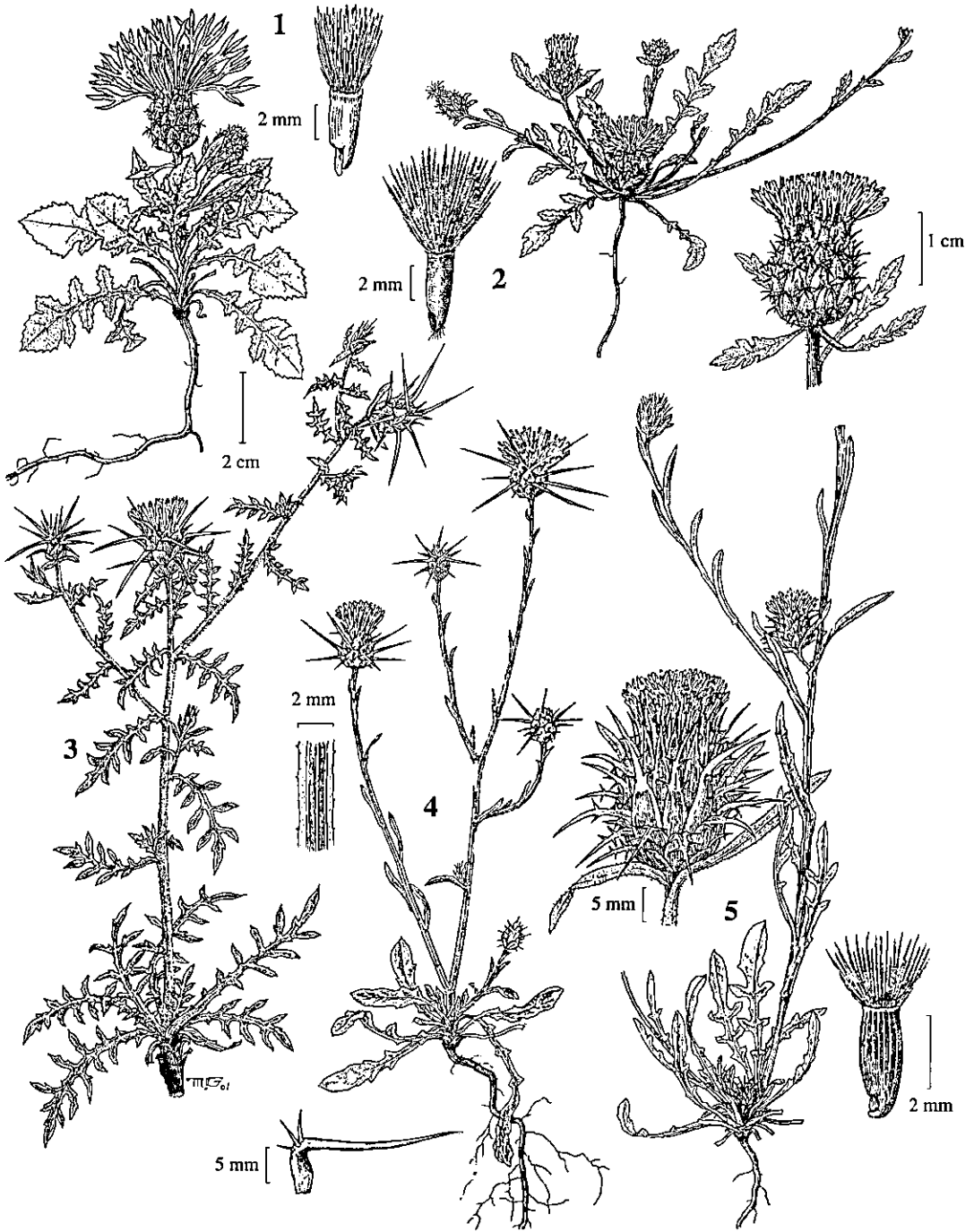
Biennial or short-lived perennial, 10-30 cm, densely crispate-woolly; stems branched from the indurate or woody base, ascending; leaves 2-6 x 0.5-2.8 cm, oblong, the cauline pinnatlobed; lobes remote, undulate; upper leaves sessile, auriculate; capitula subtended by 2-3 small leaves at the tip of the branchlets; involucre c. 1.5 x 1.5 cm, subglobose, cobwebby; outer phyllaries ovate, the inner oblong-lanceolate, ending in slender purplish spines 1-2.2 cm, with spinules to 5 mm scattered along the lower 1/3-1/2 of the spine; corollas 1.2-1.5 cm, purplish; achenes 2.5-3 x 1.2 mm, sparsely pubescent; pappus 5-6 mm, of barbellate bristles.

D, R, GE, S; desert wadis. Egypt, Palestine, Arabia.

NOTE: The type of *Centaurea aegyptiaca* was collected in Egypt.

11. *Centaurea pallescens* Delile, Descr. Egypte, Hist. Nat. 278, t. 49, f. 1 (1814).

Annual or short-lived perennial, 5-30 cm, thinly covered with crisped hairs; stems branched especially from the base, sulcate; leaves 2-8 x 1-3 cm, the basal lyrate,



**Plate 39. COMPOSITAE:** habit of: *Centaurea dimorpha* 1; achene (up right). *Centaurea furfuracea* 2; capitulum (right); achene (down left). *Centaurea postii* 3. *Centaurea solstitialis* 4; part of winged stem (left); phyllary (down left). *Centaurea melitensis* 5; capitulum (left); achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

4. **Centaurea dimorpha** Viv., Fl. Libyc. Spec. 58, t. 24, f. 3 (1824).

Syns. *Centaurea kralikii* Boiss., Diagn. Pl. Orient., ser. 2, 3: 84 (1856).

*Centaurea eriocephala* Boiss. & Reut. in Boiss., Diagn. Pl. Orient., ser. 2, 3: 86 (1856).

Arachnoid-pubescent perennial 10-30 cm; stems unbranched or branched from the base, sulcate, winged; basal leaves 3-10 x 1-3 cm, lyrate to pinnatisect, usually in a rosette, petiolate, the lobes serrate-spinose; cauline leaves shorter, decurrent; capitula 3-4.5 cm diam., pedunculate, terminal, solitary or paired, radiate; involucre 2-2.5 x 1.2-1.5 cm, ovoid; phyllaries 3-7 x 2-3 mm, multiseriate, coriaceous, broadly ovate to lanceolate, cobwebby, terminated by palmate spines 2-5 mm; corollas c. 2.5 cm, purple; achenes 4.5-5 x 2-2.25 mm, ± cylindric, sparsely hairy; hilum lateral; pappus 4-4.5 mm, of multiseriate bristles, the outer shorter than the inner.

M; sandy soils, fields, roadsides. Algeria, Tunisia, Libya, Egypt.

5. **Centaurea furfuracea** Coss. & Durieu, Bull. Soc. Bot. France 4: 363 (1857).

Dwarf arachnoid-tomentose annual; main stem reduced to a sessile or short pedunculate capitulum; lateral branches to 15 cm, procumbent; leaves 2-5 x 0.5-1.2 cm, lyrate-pinnatifid to pinnatisect, the lobes toothed, acute; basal leaves petiolate, the cauline sessile; capitula non-radiate, subtended by 2-3 pinnatifid leaves; involucre 1.5-2 cm, subglobose; phyllaries 0.7-1.5 x 2-4 mm, coriaceous, the margins scarious, with a terminal spine 2-5 mm and 2-4 lateral spines 2-3 mm; outer phyllaries broadly ovate, the middle ovate-lanceolate, the inner linear-lanceolate; corollas c. 1.5 cm, pale lemon-yellow; achenes 3.5-4 x 1-1.25 mm, ± cylindric, glabrous; hilum lateral, hairy; pappus 4.5-5 mm, of unequal white bristles.

M, Dw; sandy and stony ground. Algeria, Libya, Egypt.

6. **Centaurea postii** Boiss., Fl. Orient. 3: 688 (1875).

Densely white-woolly perennial 25-50 cm; stems erect, branched, sulcate; leaves 1.2-5 x 1-2 cm, pinnatifid to pinnatisect, the lobes simple or slightly lobed, involute, spinulose; basal leaves petiolate, the cauline sessile, not decurrent; capitula solitary at the tips of stems or branches; phyllaries 6-8 x 2.5-5 mm, terminated by a yellow spine 1-2 cm and 0-3 basal spinules 1-2 mm; outer phyllaries broadly ovate, white-woolly; inner phyllaries lanceolate, with scarious margins, glabrous; corollas c. 1.5 cm, cream to whitish; achenes 2 mm; pappus c. 6 mm, of copious white bristles.

S; loose sandy desert soils. Sinai, Palestine, Lebanon, Syria.

7. **Centaurea solstitialis** L., Sp. Pl., ed. 1, 917 (1753).

Floccose-tomentose annual 10-50 cm; stems branched, sulcate, conspicuously winged by the decurrent leaf-bases; leaves greyish-green, the basal 5-12 x 2-5 cm, lyrate-pinnatifid; cauline 1-6 x 0.2-0.5 cm, linear, entire, decurrent at the base; wings on the stems entire; capitula solitary, terminal on the branches, long-pedunculate; involucre 1.2-1.5 cm, broadly ovoid; phyllaries imbricate, floccose, the outer 2-3 x 2 mm, broadly ovate, terminated by a yellow spine 0.8-4 cm and 1-2 short spinules at the base; inner phyllaries narrowly-lanceolate, scarious-margined, glabrous; corollas 1.5-1.8 cm, yellow; achenes

1. *Centaurea eryngioides* Lam., Encycl. 1: 675 (1785).

Perennial 20-50 cm; stems several from the cottony base, conspicuously sulcate, green, glabrescent; leaves 5-12 x 0.4-2.8 cm, mainly basal, pinnatisect, the lobes unequal, with white crisped hairs; capitula on long  $\pm$  leafless peduncles; involucre 2-3 cm, ovoid, truncate at the base; phyllaries yellow-tomentose to glabrescent; outer phyllaries c. 8 x 6 mm, broadly ovate, greenish-yellow, pectinately white-fimbriate, terminated by a stout yellowish-brown spine and a few lateral spinules; middle phyllaries terminated by a rigid spine 1-3.5 cm; inner phyllaries oblong, unarmed; corollas c. 3.5 cm, pink or purple; corolla-lobes 6 mm, linear; achenes 4-5 x 3 mm, cylindrical, hairy; hilum lateral; pappus 8-9 mm, of deciduous bristles connate at the base.

De, S; rocky hillsides, mainly granite. Egypt, Palestine, Lebanon, Syria, Saudi Arabia.

2. *Centaurea ammocyanus* Boiss., Diagn. Pl. Orient., ser. 1, 10: 109 (1849).

Greyish-green cobwebby to floccose annual, 5-30 cm; stems several from the base, branched, 4-angled, grooved; leaves 1.5-6 x 0.3-1.2 cm, dentate, pinnatifid to pinnatisect, the lobes mucronate; basal leaves petiolate, the cauline sessile; capitula subtended by 2 small leaves, short-pedunculate at the tip of stems and branches, including one basal capitulum arising on a dwarf stem just above the root; involucre 1-1.2 cm, cylindrical; phyllaries oblong, glabrous, green and purple, pectinately white-fimbriate, terminated by a spinule 2-5 mm; corollas 1-1.2 cm, pink; achenes 2-2.5 mm,  $\pm$  cylindrical, pubescent; hilum lateral; pappus 2.5-3 mm, of unequal fine bristles.

S; sandy and stony wadis. Libya, Sinai, Palestine, Lebanon, Syria, Saudi Arabia, Iraq, Iran.

3. *Centaurea glomerata* Vahl, Symb. Bot. 2: 94 (1791).

Syns. *Centaurea acaulis* Forssk., Fl. Aegypt.-Arab. 152 (1775), non L., Sp. Pl., ed. 1, 914 (1753).

*Centaurea contracta* Viv., Fl. Libyc. Spec. 58, t. 24, f. 1-2 (1824).

*Centaurea glomerata* Vahl var. *glabriceps* Asch. & Schweinf., Bull. Herb. Boiss. 1: 656 (1893).

Dwarf  $\pm$  stemless, rosulate, tomentose annual, 3-10 cm, with numerous sessile or subsessile small clustered capitula; lateral procumbent branches sometimes arising from the base of clustered capitula bearing at their tips a new leaf-rosette and a new cluster of capitula; lateral branches (if present) branched or not, sulcate, naked or with 1-2 leaves; leaves 5-15 x 1.5-5 cm, petiolate, sparsely covered with white crisped hairs, the lobes dentate to pinnatifid, acute; capitula usually subtended by a small leaf; involucre 1-1.2 x 0.5-0.8 cm, ovoid; phyllaries 4-6 x 1.5-3 mm, multiseriate, broadly ovate, hairy, terminated by palmate and pectinate spines 2-4 mm; corollas c. 1 cm, bright yellow; achenes 2-2.5 x 1 mm,  $\pm$  ellipsoid, blackish, sparsely hairy; hilum lateral; pappus c. 2 mm, of scabrid white hairs.

M; cultivated ground, roadsides. Libya, Egypt.

NOTE: The type of *Centaurea acaulis* was collected in Alexandria, Egypt, April 1762, Forsskål 1075 (C, photo!).

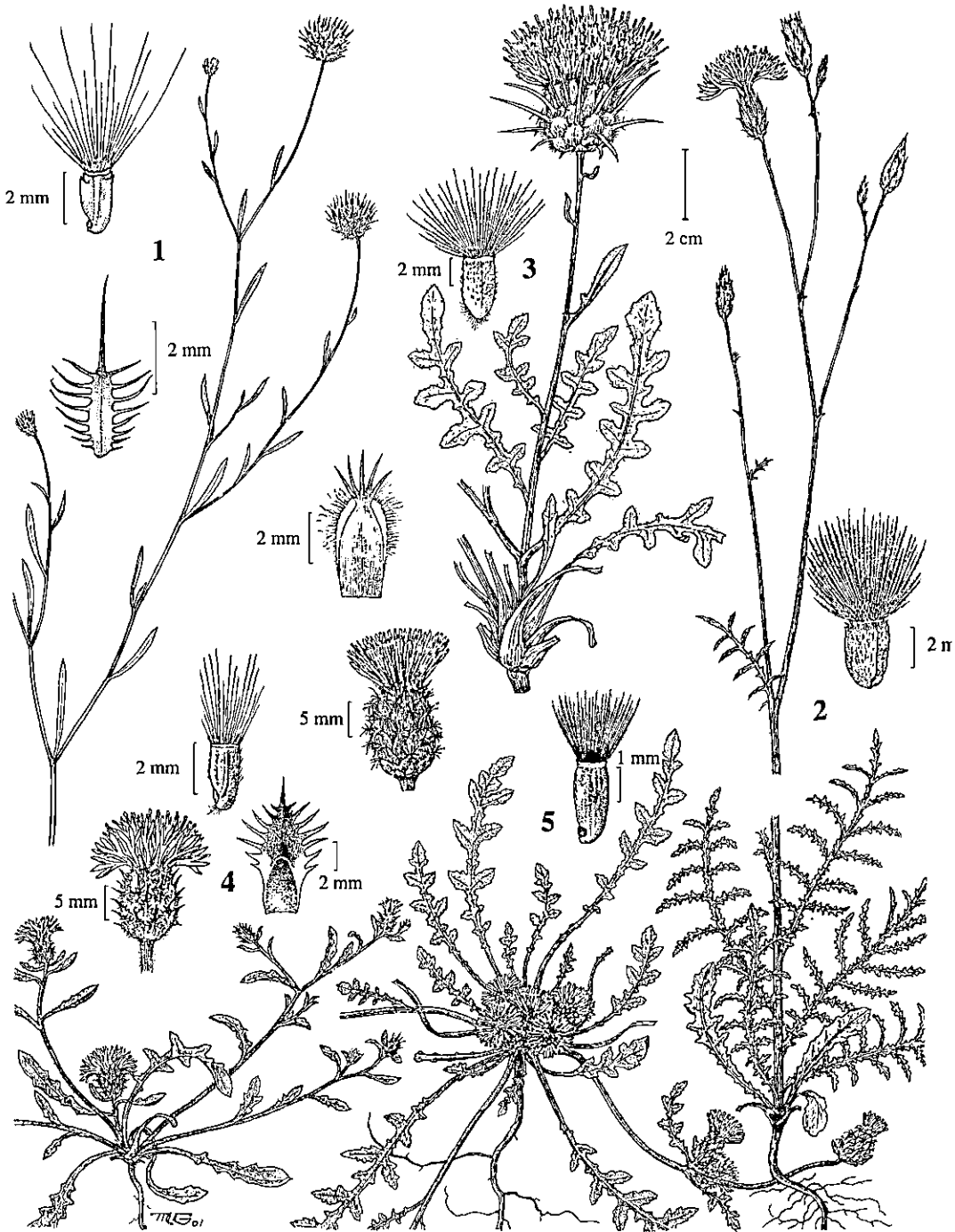
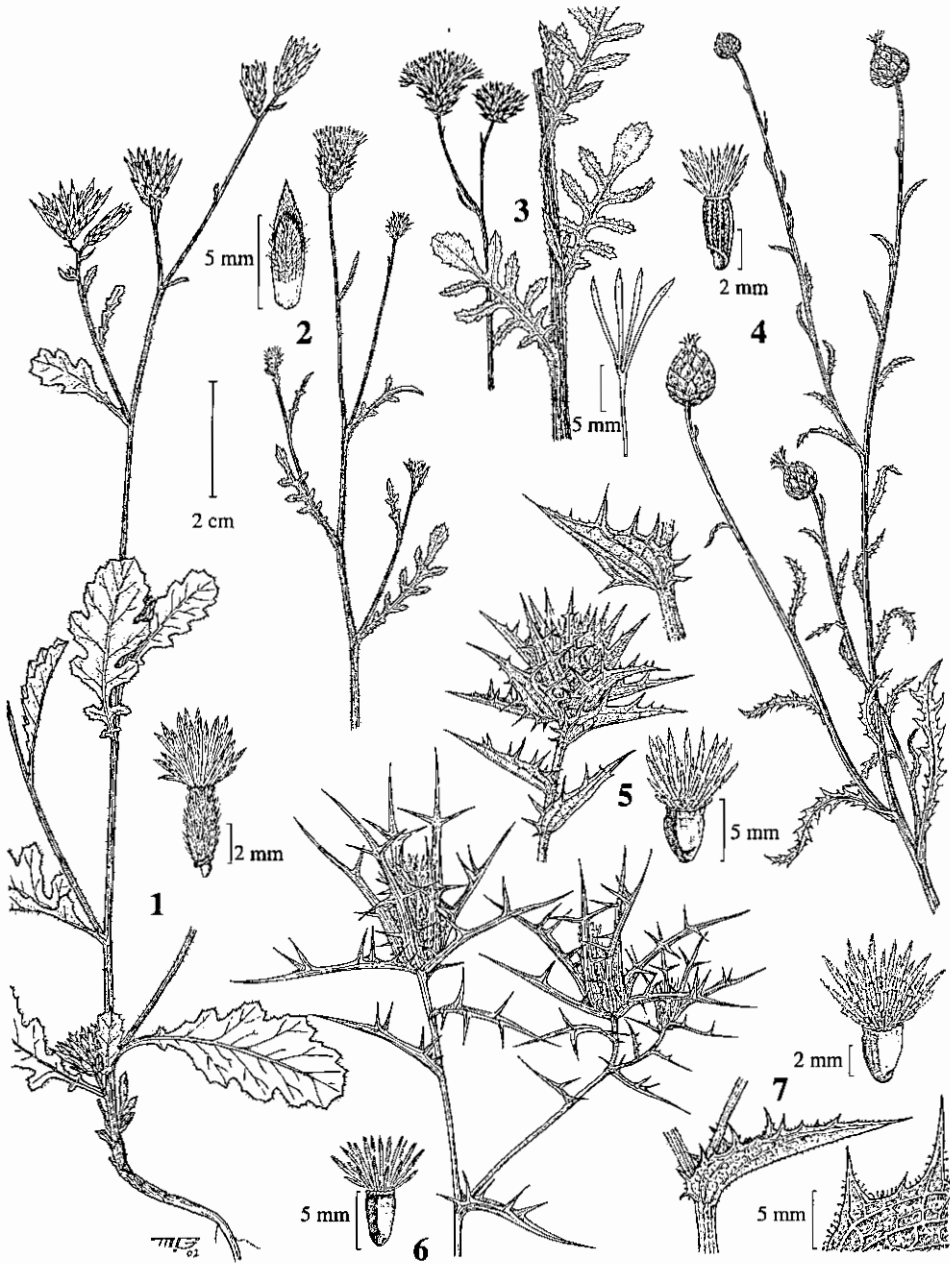


Plate 38. COMPOSITAE: *Zoegia purpurea* 1, flowering and fruiting branch; achene (up left); phyllary (left within). *Crupina crupinastrum* 2, flowering branch; basal part with root and leaves (down); achene (right). *Centaurea eryngioides* 3, habit; achene (left). *Centaurea ammocyanus* 4, habit; achene, capitulum and phyllary (up). *Centaurea glomerata* 5, habit; capitulum and phyllary (up left); achene (up within). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

4. Leaves appressed-cobwebby, canescent; outer and middle phyllaries with scarious margins 2-3 mm broad and a terminal spine 5-8 mm; pappus white, the middle setae scabridulous 15. *C. pumilio*  
+ Leaves glabrescent; outer and middle phyllaries with scarious margins 0.5 mm broad and a terminal spine 2-3 mm; pappus reddish at the base, the middle setae plumose 16. *C. aegialophila*
5. Phyllaries terminated by palmate or pectinate spines 2-5 mm 6  
+ Phyllaries terminated by a single long spine and short lateral spinules near the base 7
6. Annual; capitula 5-8 mm diam., sessile or subsessile, in dense clusters, subtended by a rosette of leaves; corollas yellow 3. *C. glomerata*  
+ Perennial; capitula 3-4.5 cm diam., terminal, pedunculate, solitary or paired; corollas purple 4. *C. dimorpha*
7. Stems winged; cauline leaves decurrent 8  
+ Stems not winged; cauline leaves not decurrent 10
8. Capitula solitary or of 2-3 together; phyllaries with spines 4-8 mm 9. *C. melitensis*  
+ Capitula solitary; phyllaries with spines to 4 cm 9
9. Cauline leaves linear, entire; wings on stems entire 7. *C. solstitialis*  
+ Cauline leaves pinnatifid to pinnatipartite; wings on stems dentate 8. *C. sinaica*
10. Stems and leaves densely white-woolly 6. *C. postii*  
+ Stems and leaves not white-woolly 11
11. Achenes epappose 12  
+ Achenes with pappus 13
12. Phyllaries with spines 3 mm broad at the base and yellow throughout; corollas mauve or white 13. *C. calcitrapa*  
+ Phyllaries with spines 5 mm broad and purplish at the base; corollas yellow 14. *C. alexandrina*
13. Phyllaries with spines 0.4-1.2 cm 14  
+ Phyllaries with longer spines 15
14. Annual, cauline leaves lyrate-pinnatifid; capitula subtended by 2-3 pinnatifid leaves 5. *C. furfuracea*  
+ Perennial; cauline leaves narrowly linear; capitula not subtended by leaves 17. *C. scoparia*
15. Capitula glabrous 11. *C. pallescens*  
+ Capitula cobwebby 16
16. Cauline leaves lanceolate, dentate, not lobed; spines of phyllaries stout, with spinules restricted to the base of the spine; corollas yellow 12. *C. procurrens*  
+ Cauline leaves oblong, pinnatilobed; spines of phyllaries slender, with spinules scattered along the lower 1/3-1/2 of the spine; corollas purplish 10. *C. aegyptiaca*



**Plate 43. COMPOSITAE:** *Volutaria sinaica* 1, habit; achene (middle right). *Volutaria lippii* 2, flowering branch; phyllary (up left). *Volutaria tubuliflora* 3, leafy and flowering branches; floret (down right). *Mantisalca salmantica* 4, flowering branch; achene (up left). *Carthamus lanatus* 5, flowering branchlet; basal leaf (up right); achene (down right). *Carthamus nitidus* 6, flowering branch; achene (down left). *Carthamus glaucus* subsp. *alexandrinus* 7, basal leaf and part of the leaf; achene (up right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

*Amberboa leucantha* Coss. ex Batt. in A. Chev., Bull. Herb. Boiss., sér. 2, 3: 774 (1903).  
*Volutaria leucantha* (Coss. ex Batt.) Maire in Jahand. & Maire, Cat. Pl. Maroc 3: 818 (1934).

Scabrid annual 15-40 cm; stems branched; leaves 3-10 x 1-4.5 cm; basal leaves serrate to pinnatilobed, petiolate; cauline leaves pinnatifid to pinnatipartite, sessile; capitula terminal, solitary; involucre 1.5 x 0.6 cm, obconical, slightly hairy; outer phyllaries 2-3 x 1-1.5 mm, broadly ovate, 3-nerved, the margins scarious, the apex acute, black; middle phyllaries 4.5-5.5 x 1.5-2 mm, lanceolate, 3-nerved, the margins scarious, with acute black apex; inner phyllaries 1.5 x 0.15-0.2 cm, narrowly lanceolate, 3-5-veined, the margins scarious, the apex acute; corolla c. 1.5 cm, white with pink lobes; achenes 4.5-5 x 1.5-1.75 mm, ± cylindric, ribbed, hairy; hilum nearly basal; pappus c. 4 mm, of multiseriate purplish scales, the outer shorter than the inner.

De. GE, S; desert wadis. North Africa, Sinai, Oman.

NOTE: The type of *Amberboa sinaica* was collected in Sinai (G-DC). According to Wagenitz, Candollea 46: 409 (1991), this species is widespread from Morocco through the southern parts of Algeria (Hoggar Mountains) to Egypt and Oman. It is easily recognized by its reddish (purplish) pappus with a basal, or nearly basal, hilum of the achenes. He added that the authority of de Candolle has been generally neglected, probably partly due to the fact that the species is very rare in the Sinai peninsula. The study of the type specimen leaves no doubt about its identity with *Volutaria leucantha*.

2. ***Volutaria lippii*** (L.) Cass. ex Maire in Jahand. & Maire, Cat. Pl. Maroc 3: 817 (1934).  
Syns. *Centaurea lippii* L., Sp. Pl., ed. 1, 910 (1753).  
*Amberboa lippii* (L.) DC., Prodr. 6: 559 (1838).

Scabrid annual 20-50 cm; stems branched, grooved; leaves 3-12 x 1-4 cm, pinnatisect, lobes remotely serrate, mucronate; basal leaves petiolate, the cauline sessile and decurrent; capitula terminal, solitary or paired; involucre c. 1.2 x 1 cm, broadly ovoid; phyllaries 0.25-1 x 0.1-0.2 cm, multiseriate, pubescent, with scarious or yellowish margins and a spiny acute yellowish tip, the outer shortest, the middle longer, the innermost longest; corollas 1.5 cm, blue, turning pink when dry; achenes 2.5-2.75 x 1 mm, hairy, hilum lateral; pappus 1.5-2 mm, of white scales.

M, D, R, S; desert wadis, waste ground. North Africa, southwest Asia, naturalized in southwest Spain.

NOTE: The type of *Centaurea lippii* was collected in Egypt.

3. ***Volutaria tubuliflora*** (Murb.) Sennen., Campagn. Bot. Maroc Orient. 1930-1935, in observ. (1936).  
Syn. *Amberboa tubuliflora* Murb., Act. Univ. Lund 33 (12): 105, t. 6, f. 17-18 (1897).

Like *Volutaria lippii*, but plant to 1.2 m; leaf-lobes sharply serrate; capitula solitary or in clusters of 2-4; phyllaries with brown margins and spiny acuminate apex; corolla purplish-pink; achenes 3.5-4 x 1 mm; pappus 2.5-3 mm.

M; edges of cultivation, roadsides. Canary Islands, Spain (Almería), Italy (Linosa Island), North Africa.



4. **Volutaria crupinoides** (Desf.) Maire in Jahand. & Maire, Cat. Pl. Maroc 3: 818 (1934).  
Syns. *Centaurea crupinoides* Desf., Fl. Atlant. 2: 293 (1799).  
*Amberboa crupinoides* (Desf.) DC., Prodr. 6: 559 (1838).

Glabrescent annual 20-80 cm; stems slender, branched, sulcate; leaves 4-12 x 1.5-5 cm, the basal and lower cauline petiolate, pinnatifid to pinnatipartite; upper cauline leaves sessile, pinnatisect, with narrow serrate lobes; capitula solitary, on slender peduncles to 18 cm; involucre 1.5 x 1.2 cm, ovoid, covered with soft white hairs before anthesis, later sparsely hairy; phyllaries 0.2-1.2 x 0.1-0.2 cm, 3-5-veined, the outer shortest, progressively longer, the innermost longest; outer and middle phyllaries black at the apex and margins, not spiny-tipped, the inner black only at the apex; marginal florets with blue corollas; disc florets with orange-yellow corollas; achenes 3 x 1.5 mm, wrinkled, hairy; pappus 3 mm, cream.

M, De, S; sandy and stony ground. North Africa, Sinai, Palestine.

14. **Mantiscalca** Cass.  
Syn. *Microlonchus* Cass.

Perennial, biennial or annual unarmed herbs; stems leafy, branched; capitula heterogamous, slightly radiate; involucre ovoid; phyllaries multiseriate, imbricate, coriaceous, ending in a deciduous mucro or short spinule; florets with rose-purple corollas, the marginal with staminodes; receptacle bearing smooth setae; achenes slightly compressed, in some species dimorphic, ribbed, transversely rugose; hilum lateral, near the base; pappus multiseriate, of scabrous bristles, the innermost a ring with one or rarely few long bristles. 4 species, Mediterranean region.

1. **Mantiscalca salmantica** (L.) Briq. & Cavill., Arch. Sci. Phys. Nat. Genève, sér. 5, 12: 111 (1930).  
Syns. *Centaurea salmantica* L., Sp. Pl., ed. 1, 918 (1753).  
*Microlonchus salmanticus* (L.) DC., Prodr. 6: 563 (1838).  
*Microlonchus duriaei* Spach, Ann. Sci. Nat., sér. 3, 4: 166 (1845).  
*Mantiscalca duriaei* (Spach) Briq. & Cavill., Arch. Sci. Phys. Nat. Genève, sér. 5, 12: 112 (1930).

Glabrous annual 20-50 cm; stems erect, much-branched, sulcate; basal leaves 2-6 x 0.5-1 cm, pinnatifid, the lobes dentate; cauline leaves smaller, the uppermost linear, denticulate or entire; involucre 1.5-2 x 1-1.4 cm; phyllaries multiseriate, coriaceous, straw-coloured, glabrous, glossy, ovate to lanceolate, narrowly scarious-margined, mucronate; corollas purplish; achenes c. 4 x 1 mm, dimorphic, wrinkled, the marginal epappose, with a basal hilum, the inner pappose, with a lateral hilum; the hilum carunculate; pappus c. 3 mm.

M; weed of cultivation. Southern Europe, North Africa, Turkey.

15. **Carthamus** L.  
Syn. *Kentrophyllum* DC.

Spiny annuals or biennials, with glandular and villous-lanate to arachnoid indumentum; leaves alternate, entire to pinnatisect, the margins spiny; capitula homogamous; involucre ovoid, surrounded by involucre leaves similar to upper cauline leaves; phyllaries multiseriate, imbricate, spiny, the median sometimes with apical appendages, the inner

acuminate; receptacle flat, densely setose; corollas orange, yellow, pink or purple; achenes obpyramidal, 4-angled, glabrous, the outer rugose and epappose, the inner smooth and usually with a persistent multiseriate pappus of narrow scales. 17 species, Mediterranean region, Europe, southwest and Central Asia.

- |   |   |
|---|---|
| 1. Corollas yellow; pappus-scales acute   | 1. <i>C. lanatus</i>                            |
| + Corollas purple, violet, pink or white; pappus-scales obtuse or emarginate  | 2   |
| 2. Stems white-glossy; leaves glabrous  | 2. <i>C. nitidus</i>                            |
| + Stems not white-glossy; leaves pubescent, glandular-viscid  | 3   |
| 3. Cauline leaves broadly ovate-lanceolate, the marginal spines much shorter than 1/2 the width of the blade; outer phyllaries c. 8 mm diam.; |   |
| pappus 1 1/2 times as long as the achene  | 4. <i>C. glaucus</i> subsp. <i>alexandrinus</i> |
| + Cauline leaves linear-lanceolate, the marginal spines longer than 1/2 the width of the blade; outer phyllaries 3-5 mm diam.;                |   |
| pappus about twice as long as the achene  | 3. <i>C. tenuis</i> subsp. <i>foliosus</i>      |

1. *Carthamus lanatus* L., Sp. Pl., ed. 1, 830 (1753).

Annual or biennial 20-80 cm; stems straw-coloured, branched, sparsely lanate-villous and glandular-hairy; basal and lower cauline leaves 2-6 x 1-1.5 cm excluding the spines, petiolate, glandular-villous, lobed; lobes dentate-spinulose; other cauline leaves pinnatifid to pinnatisect, the lobes dentate-spiny; capitula solitary, 2.5-3.5 x 1.5-2 cm excluding the outer spreading bracts, ovoid; outer and middle phyllaries 1.6-2.2 x 0.5-0.7 cm, oblong-lanceolate, hairy above, scarious-margined; apical appendages ± orbicular, scarious, the margins ciliate; inner phyllaries 1.5-2 x 0.15-0.25 cm, linear-lanceolate, acuminate; corollas 2.5 cm, yellow; achenes 4 x 2.5 mm, obpyramidal, 4-angled; pappus scales 4-8 mm, persistent; outer achenes epappose.

N, M; waste ground, roadsides, edges of cultivation. Mediterranean region, western and Central Europe, southern Russia, Caucasus, Arabia, Iraq, Iran, extending to Central Asia.

NOTE: Vilatersana *et al.*, Bot. J. Linn. Soc. 134: 434 (2000), cited a specimen collected from Burg [Bourg] el-Arab, west of Alexandria, Egypt, identified to *Carthamus creticus* L. However, according to Hanelt in Tutin *et al.* (eds). Fl. Europ. 4: 303 (text), 467 (index), 1976, *Carthamus creticus* is best treated as a synonym of *Carthamus lanatus* L. subsp. *baeticus* (Boiss. & Reut.) Nyman, a subspecies restricted to the Mediterranean islands, southern Greece and southern Spain. Since *Carthamus lanatus* is known from Egypt (Täckholm 1974, Boulos 1995) as one of the summer-flowering thistles of the Mediterranean coastal region, the specimen cited by Vilatersana (Susanna 1851 & Vilatersana, 7. vi. 1998), collected from "Egypt, Alexandria: near El 'Amriya [El Amiriya], in front of the macaroni factory" (BC), refers most probably to *Carthamus lanatus*.

2. *Carthamus nitidus* Boiss., Fl. Orient. 3: 708 (1875).

Glabrous annual 20-70 cm; stems white-glossy, much-branched above; basal leaves 5-10 x 2-4 cm, lyrate, the lobes denticulate; cauline leaves 3-5 x 1.5-2.5 cm, pinnatifid into lanceolate spiny lobes; capitula 2 x 1 cm, narrowly-ovoid, solitary at the tips of branches;

outer phyllaries to 3.5 cm, with lateral spines, the inner to 2.5 cm, oblong-ovoid, pectinate-denticulate below the terminal spine; corollas 1.6 cm, pale pink; achenes 4.5 x 2.5 mm,  $\pm$  obpyramidal, 4-angled, yellowish-grey, glabrous; pappus 5-6 mm, multiseriate, of scabridulous unequal obtuse scales.

GE, S; stony ground. Egypt, Palestine, Lebanon, Syria, Arabia.

3. ***Carthamus tenuis*** (Boiss. & Blanche) Bornm., Verh. Zool.-Bot. Ges. Wien 48: 605 (1898) subsp. ***foliosus*** Hanelt, Feddes Repert. 67: 122 (1963).  
Syns. *Kentrophyllum tenue* Boiss. & Blanche in Boiss., Diagn. Pl. Orient., ser. 2, 3: 51 (1856).  
*Carthamus glaucus* M. Bieb. var. *tenuis* (Boiss. & Blanche) Boiss., Fl. Orient. 3: 707 (1875).

Glandular-arachnoid annual 20-80 cm; stems branched; basal leaves 2.5-8 x 0.5-1.5 cm, oblanceolate, pinnatifid to pinnatisect; cauline leaves smaller, linear-lanceolate, dentate-spiny or pinnatifid into narrow spine-tipped lobes, the marginal spines longer than  $\frac{1}{2}$  the width of the blade; capitula 2-2.5 x 1 cm, narrowly ovoid; involucrate leaves 2-3.5 x 0.3-0.5 cm, linear-lanceolate, recurved, with 3-5 pairs of short lateral spinules; median and inner phyllaries 2-2.5 x 0.5 cm, lanceolate, scarious, spine-tipped; corollas 2.5-3 cm, purple or pink; achenes 4 x 3 mm, obpyramidal, obscurely 4-angled; pappus  $\pm$  twice as long as the achenes, median scales often truncate.

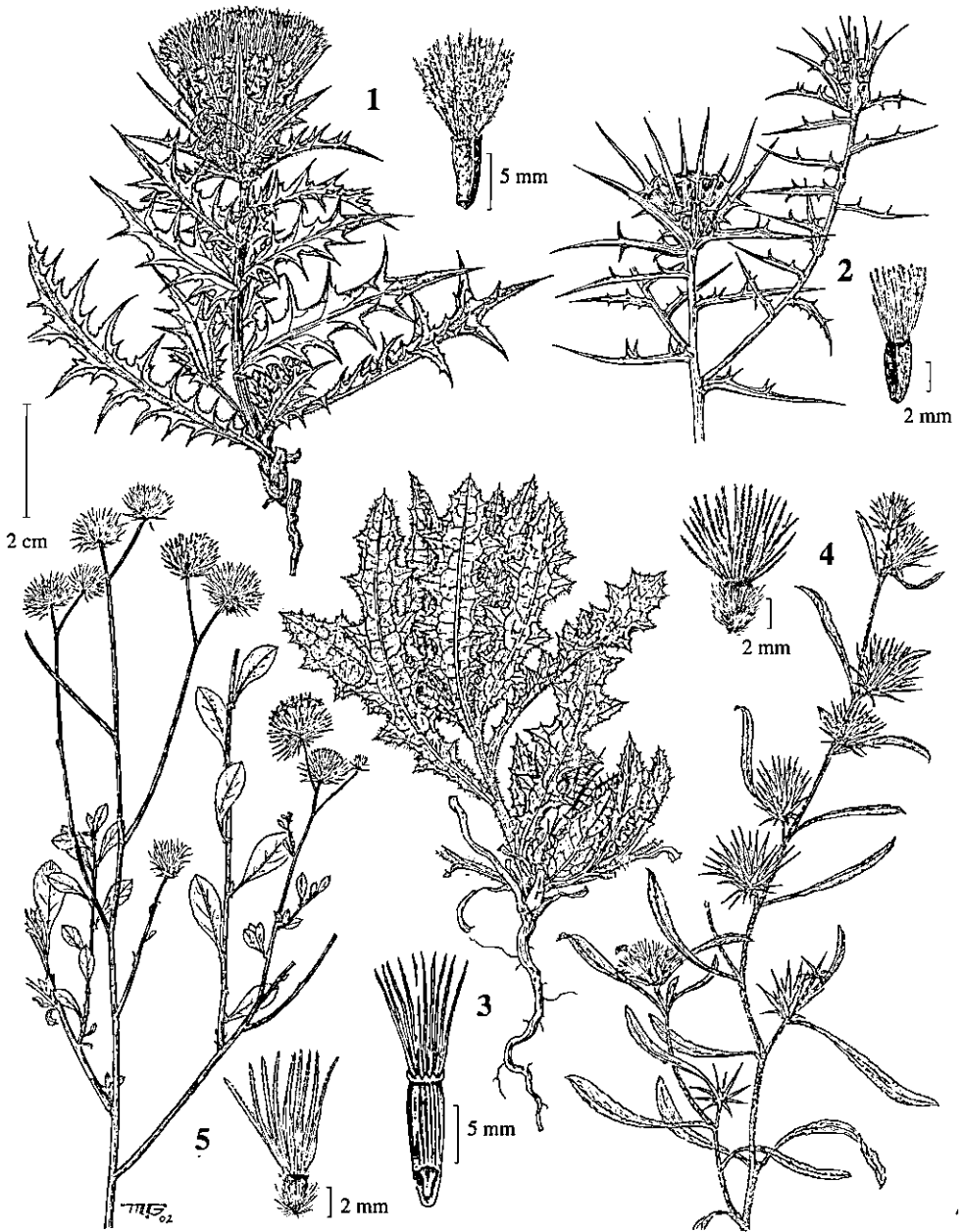
N, O, M, D, S; roadsides, sandy soils. Egypt, Palestine, Cyprus.

4. ***Carthamus glaucus*** M. Bieb., Tabl. Prov. Casp. 118 (1798) subsp. ***alexandrinus*** (Boiss. & Heldr.) Hanelt, Feddes Repert. 67: 113 (1963).  
Syns. *Kentrophyllum alexandrinum* Boiss. & Heldr. in Boiss., Diagn. Pl. Orient., ser. 2, 6: 115 (1859).  
*Carthamus glaucus* M. Bieb. var. *alexandrinus* (Boiss. & Heldr.) Boiss., Fl. Orient. 3: 707 (1875).  
*Carthamus alexandrinus* (Boiss. & Heldr.) Bornm., Verh. Zool.-Bot. Ges. Wien 48: 605 (1898).

Grey glandular-viscid annual, 30-60 cm; stems branched above; basal leaves 5-12 cm, sub-lyrate, with up to 6 pairs of lobes; cauline leaves smaller, ovate-lanceolate, the marginal spines much shorter than  $\frac{1}{2}$  the width of the blade; capitula 1.5 cm diam., ovoid, at the tips of branches; involucre leaves 2.5-4 cm; outer phyllaries c. 8 mm diam., oblong-lanceolate, entire, ending in a spine; corollas white or faintly purple-flushed, the central blackish; achenes 3.5-4.5 x 2.5-3 mm; pappus-scales  $1\frac{1}{2}$  times as long as the achene.

M; roadsides, waste ground. Libya, Egypt.

NOTE: The type of *Carthamus glaucus* was collected in Alexandria, Egypt: "in arenosis maritimis ad Alexandriam Egypti prope Ramleh", Samaritani (G, holotype). Vilatersana *et al.*, Bot. J. Linn. Soc. 134: 431 (2000) cited a specimen collected from Alexandria, Egypt, 245 km from Marsa Matruh, near the tourist village [Bourg-el-Arab] Burg-el-Arab, Susanna 1848 & Vilatersana, 6. vi. 1998 (BC), identified as *Carthamus alexandrinus* (Boiss. & Heldr.) Asch. [correct authors: (Boiss. & Heldr.) Bornm.], which is generally treated as a synonym of *Carthamus glaucus* subsp. *alexandrinus* (Boiss. &



**Plate 44.** COMPOSITAE: *Carduncellus eriocephalus* 1, habit; achene (up right). *Carduncellus mareoticus* 2, flowering branch; achene (down right). *Cnicus benedictus* 3, habit; achene (down left). *Dicoma tomentosa* 4, flowering and fruiting branch; achene (up left). *Dicoma schimperi* 5, flowering and fruiting branch; achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

Heldr.) Hanelt, or as a synonym of var. *alexandrinus* (Boiss. & Heldr.) Boiss. (see synonymy above). In this work we follow Hanelt.

## 16. *Carduncellus* Adans.

Perennial herbs or low shrubs; leaves spiny; capitula solitary, terminal, homogamous, discoid; involucre surrounded by leathery involucral leaves; phyllaries multiseriate, with fimbriate appendages; all florets tubular, bisexual; corollas blue, white or yellow, with a tuft of hairs below the tip; achenes sharply 4-winged; hilum lateral; pappus of multiseriate plumose or scabrid bristles. 29 species, Mediterranean region.

1. Capitula c. 4 x 3 cm, solitary; corollas white; pappus plumose      1. *C. eriocephalus*  
+ Capitula 1.5-2 cm, numerous; corollas pale yellow; pappus scabrid      2. *C. mareoticus*

1. *Carduncellus eriocephalus* Boiss., Diagn. Pl. Orient., ser. 1, 10: 100 (1849).

Perennial herb 15-30 cm, sparsely crispate-hairy; stems unbranched or branched from the base; basal and lower cauline leaves 6-8 x 2-3 cm, pinnatipartite, petiolate, the lobes spiny; cauline leaves smaller, pinnatifid, sessile, clasping, the lobes spiny; capitula c. 4 x 3 cm, broadly ovoid, solitary on the tips of stems or branches, homogamous; involucre cobwebby, surrounded by involucral leaves; outer phyllaries 2.5-3 x 1-1.2 cm, deltoid, apex and upper margins spiny; middle phyllaries c. 3 x 0.6 cm, oblong-lanceolate, the apex obtuse, with ciliolate spinules; inner phyllaries c. 3 x 0.3 cm, oblong-linear, scarious-margined, the apex dilated and ciliolate; corollas 3-3.5 cm, white; achenes 6-7 x 2.5 mm, strongly 4-angled; pappus 1.2 cm, of plumose bristles.

M, D, S; sandy and calcareous ground. Libya, Egypt, Palestine, Arabia.

NOTE: Täckholm (1974), p. 546, treats this taxon as *Carduncellus eriocephalus* Boiss. var. *albiflora* Gauba.

2. *Carduncellus mareoticus* (Delile) Hanelt, Feddes Repert. 67: 170 (1963).

Syn. *Carthamus mareoticus* Delile, Descr. Egypte, Hist. Nat. 276, t. 48, f. 1 (1814).

Low shrub, 30-60 cm; stems much branched; leaves 1-4 x 0.3-0.5 cm, narrowly lanceolate, with sharp spiny margins and acuminate spiny apex; capitula 1.5-2 x 0.8-1.2 cm, numerous, solitary at the tips of branches; involucre slightly cobwebby; involucre leaves 2.5-4 cm, leaf-like; outer phyllaries 1 x 0.8 cm, broadly ovate, abruptly tapering into a spine 4-6 mm and short spinules at the upper margins; middle phyllaries 1.2 x 0.4-0.5 cm, broadly lanceolate, the apex obtuse with ciliolate short spinules; inner phyllaries 1.2 x 0.3 cm, oblong-linear, narrow scarious-margined, the apex dilated and ciliolate; corollas 1.4-1.6 cm, pale yellow; achenes 3.5-4 x 1.5-2 mm, narrowly obpyramidal, 4-angled, glabrous, glossy; pappus 4-5 mm, of scabrid bristles.

M, Dw; sandy and calcareous roadsides, waste ground. Libya, Egypt.

NOTE: The type of *Carthamus mareoticus* was collected in Alexandria, Egypt, between Lake Mariut and the sea, Delile, s.n. (MPU).

17. **Cnicus** L., nom. conserv.

Annuals; leaves alternate; capitula heterogamous, disciform; phyllaries multiseriate, imbricate, ending in a pinnate spine; receptacle covered with long bristles; inner florets bisexual, the marginal sterile; corolla tubular; filaments papillose, free; anthers with short appendages at the base; achenes with prominent ribs and an elevated dentate apical rim, glabrous; hilum lateral; pappus 2-seriate, outer of 10 long and inner of 10 shorter bristles, deciduous. 1 species, Caucasus, southern Europe, Mediterranean region, Sinai, Arabia, Iraq, Iran, Afghanistan.

1. **Cnicus benedictus** L., Sp. Pl., ed. 1, 826 (1753).

Cobwebby annual 10-30 cm; stems dwarf, with a terminal capitulum and often decumbent divaricate branches from the base; leaves 5-15 x 1.5-4 cm, alternate, pale green, thin-leathery, oblong-lanceolate, sinuate-pinnatifid, prominently reticulate-veined on the lower surface, the margins spinulose-dentate; basal leaves short-petiolate, the cauline sessile, clasping; capitula 3.5-4.5 x 2.5-3.5 cm, broadly ovoid, surrounded and overtopped by ovate-oblong, spinulose floral leaves; phyllaries oblong-lanceolate, glabrous, tapering to a pinnately divided spine; corollas yellowish with violet veins; achenes 0.8-1 x 0.3 cm, oblong-cylindrical; pappus 1.2-1.5 cm, 2-seriate, the outer of 10 awns, the inner of 10 shorter bristles, deciduous.

S; rocky hillsides. Distribution as for the genus.

NOTE: Some authors include this species in the genus *Centaurea*.

18. **Dicoma** Cass.  
Syn. *Hochstetteria* DC.

Literature: Pope, G. V. 1990. Notes on *Dicoma* Cass. (Compositae). Kew Bull. 46: 699-709.

Perennials, sometimes annuals or shrubs; leaves alternate, sessile; capitula homogamous, sometimes heterogamous, solitary and terminal on the branches, or in cymes; phyllaries multiseriate, imbricate, the outer acutely attenuate and spinescent; receptacle alveolate; florets bisexual; corolla tubular below, narrowly campanulate above, deeply divided into 5 narrow equal lobes; anthers barbellate; style-branches short, hairy; anthers villous or setose; pappus multiseriate, of barbellate or plumose bristles or scales. About 35 species, tropical and southern Africa and Madagascar, 1 species extending to tropical Asia.

- |   |                        |
|---|------------------------|
| 1. Annual; leaves white-tomentose; capitula sessile or subsessile;<br>involucre tomentose | 1. <b>D. tomentosa</b> |
| + Perennial; leaves glabrous; capitula on peduncles to 15 cm;<br>involucre glabrous       | 2. <b>D. schimperi</b> |

1. **Dicoma tomentosa** Cass., Bull. Soc. Philom. Paris 1818: 47 (1818).

Tomentose annual 10-50 cm; stems much-branched, tinged purple; leaves 2-8 x 0.2-1 cm, narrowly lanceolate, white-tomentose, the base attenuate, the apex apiculate; capitula solitary or few in the leaf axils, sessile or subsessile; involucre 1.2-1.6 cm, tomentose; phyllaries multiseriate, progressively longer inwards; outer phyllaries spreading or recurved, narrowly-lanceolate, attenuate-acuminate into a scabrid spine, scarious-

margined; florets 5-15, bisexual; corollas 5-7 mm, pale yellow; styles purple; achenes 2.5-3 x 2 mm, 10-ribbed, densely hairy; pappus 5-6 mm, of outer barbellate hairs and inner lanceolate membranous scales.

GE; sandy ground. Egypt, Arabia, eastwards to Pakistan and western India, tropical East and West Africa, Sudan, Ethiopia, Somalia, southwards to Namibia and South Africa.

2. *Dicoma schimperi* (DC.) Baill. ex Hoffm. in Engl. & Prantl, Natürl. Pflanzenfam. 4, 5: 339 (1893).  
Syn. *Hochstetteria schimperi* DC., Prodr. 7: 287 (1838).

Glabrous perennial herb 30-80 cm; stems much-branched, sulcate; leaves 1.5-5 x 0.3-1 cm, oblanceolate or linear-oblanceolate, the margins obscurely serrate-spinulose, attenuate to a short petiole, the apex mucronate; capitula solitary, on peduncles to 15 cm, supported by 2-4 short leaves; involucre 1.2 x 1.5 cm, glabrous; phyllaries multiseriata, progressively longer inwards, narrowly lanceolate, attenuate-acuminate into a scabrid spine, scarious-margined; florets numerous, bisexual; corollas 7-9 mm, yellowish; achenes 2.5-3 x 1.75 mm, obpyramidal, with a dense basal tuft of bristles; pappus 6-8 mm, of 9 scabrid involute bristles connate at the base, persistent.

De, GE, S; sandy and stony deserts. Egypt, Arabia, eastwards to India.

19. *Ethulia* L.f.  
Syn. *Hoehnelia* Schweinf.

Literature: Gilbert, M. G. & C. Jeffrey. 1988. A revision of *Ethulia* (Compositae: Vernoniae). Kew Bull. 43 (2): 165-193.

Annual or perennial herbs; leaves alternate, subsessile, glandular-hairy; capitula homogamous, small; involucre short; phyllaries imbricate, 2-4-seriate; receptacle flat, naked; florets long-exserted from the involucre; corollas 5-lobed, pink or purple; corolla-tube narrow at the base, widening above into a cylindrical part, glandular; style branches stout, hairy; achenes 2-6-angled, ribbed, glandular between the ribs, crowned by an apical rim or cup; pappus absent or rarely of a short corona. 19 species, tropical Africa and Asia, 1 widespread weedy species.

1. *Ethulia conyzoides* L.f., Decas Prima 1, t. 1 (1762) subsp. *conyzoides*

Aromatic pubescent annual; stems 30-80 cm, branched, erect or ascending, sometimes prostrate and rooting at the nodes; leaves 3.5-12 x 0.8-4 cm, lanceolate to ovate, obscurely serrate, the base cuneate; inflorescence a rather lax scorpioid cyme; capitula in sessile clusters; involucre 2-2.5 x 2-2.5 mm, campanulate at anthesis, rotate in fruit and not concealing the outer achenes; phyllaries 3-seriate, 1-2.5 mm, lanceolate, acute, glandular-pubescent, purplish at the tip, otherwise green, the margins scarious and ciliate; florets 20-30 per capitulum; corollas 1.25-2 mm, purple; fruiting heads 2.5-4 mm broad; achenes 1.25-2 x 1-1.2 mm, obconical, truncate, strongly 4-5-ribbed, forming a smooth subglobose mass when fully mature; pappus absent.

N, M; Nile and canal banks, moist ground. Egypt, Syria, most of tropical Africa, southern and southeast Asia.

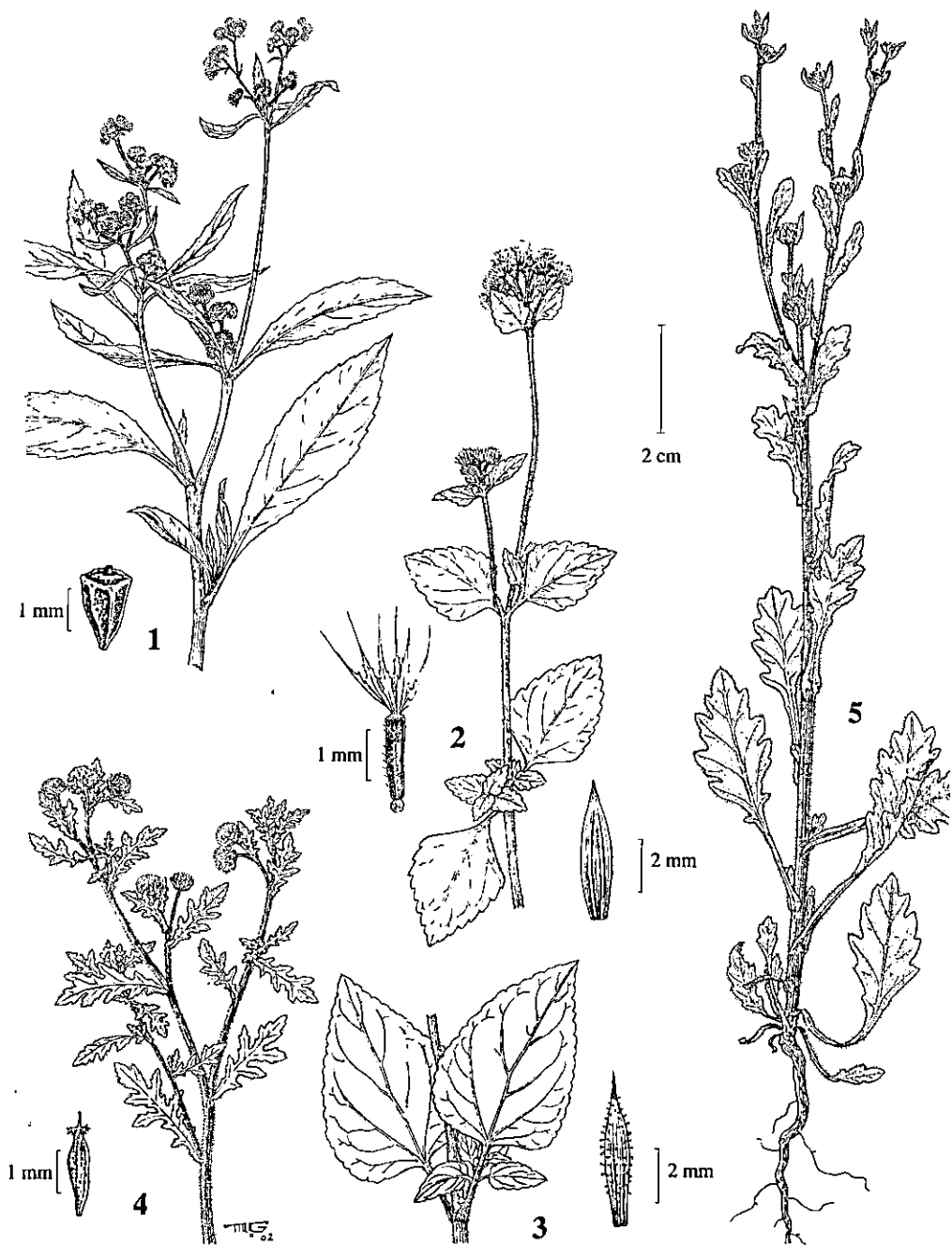


Plate 45. COMPOSITAE: *Ethulia conyzoides* 1, flowering and fruiting branch; achene (down left). *Ageratum conyzoides* 2, flowering and fruiting branch; achene (down left); phyllary (down right). *Ageratum houstonianum* 3, leafy branchlet; phyllary (right). *Grangea maderaspatana* 4, flowering and fruiting branch; achene (down left). *Ceruana pratensis* 5, habit. All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.



NOTE: According to Jeffrey & Beentje in Beentje & Smith (eds), 2000, the other subspecies, subsp. *kraussii* (Walp.) M. G. Gilbert, is known from Mozambique, South Africa and Brazil.

20. *Ageratum* L.  
Syn. *Cerelia* Adans.

Literature: Johnson, M. F. 1971. A monograph of the genus *Ageratum* L. (Compositae-Eupatorieae).  
Ann. Missouri Bot. Garden 58: 6-88.

Annuals, perennials or low shrubs; leaves opposite, sometimes alternate, ovate, elliptic, oblong-linear, lanceolate or deltoid, pubescent to glabrous; inflorescence of corymbose clusters or capitula solitary; phyllaries 2-3-seriate, narrowly lanceolate, lanceolate or oblong, the apex gradually or abruptly contracted, the margins entire or apically erose or fimbriate, stipitate-glandular to glabrous; receptacle naked; corollas tubular, blue, lavender or white; achenes scabrous on angles; carpopodium basal; pappus coroniform, of 5-6 free scales or awns, or absent. About 40 species, tropical America, 1 pantropical weed.

1. Leaves ovate to deltoid, the base cordate to truncate; phyllaries narrowly lanceolate, the apex long-acuminate, entire, pilose and stipitate-glandular 2. *A. houstonianum*  
+ Leaves ovate, the base obtuse, never cordate or truncate; phyllaries oblong-lanceolate, sparsely pilose to glabrous, eglandular, the apex abruptly contracted or gradually acuminate, erose to fimbriate, rarely entire 1. *A. conyzoides*

1. *Ageratum conyzoides* L., Sp. Pl., ed. 1, 839 (1753).  
For synonymy see Johnson (1971).

Annual 20-60 cm; stems branched, reddish-green, sulcate, sparsely white-puberulent, pilose to  $\pm$  glabrous; leaves 3-6 x 2-5 cm, opposite, ovate, petiolate; upper smaller and sometimes alternate, the base obtuse, the margins crenate, the upper surface pilose (especially along the veins) to  $\pm$  glabrous; inflorescence of 4-16 capitula in terminal cymose clusters; peduncle 0.5-1.5 cm, bracteolate, puberulent; involucre campanulate; phyllaries 2-seriate, 3-4.5 x 0.5-1.5 mm, oblong-lanceolate, 2-ribbed, pilose to glabrous, eglandular, the margins scarious, entire; apex abruptly contracted to gradually acuminate, erose to fimbriate, rarely entire; corollas 1.5-2.5 mm, tubular to funnel-shaped, bluish-violet; achenes 1.25-1.75 x 0.4 mm, 5-angled, scabrous along the angles, black; carpopodium basal, white; pappus 1.5-2 mm, of 5(-6) oblong scales, connate at the base, abruptly tapering to a scabrous seta, yellowish-brown.

N, O (Dakhla); moist habitats, Nile and canal banks. Tropical and subtropical regions of the world.

2. *Ageratum houstonianum* Mill., Gard. Dict., ed. 8, no. 2 (1768).  
Syn. *Ageratum conyzoides* L. var. *mexicanum* sensu Täckh., Stud. Fl. Egypt, ed. 2, 547 (1974).  
For full synonymy see Johnson (1971).

Like *Ageratum conyzoides*, but leaves ovate to deltoid, the base cordate to truncate; capitula larger, phyllaries 4-5 mm, narrowly lanceolate, the apex long-acuminate, entire, pilose and stipitate-glandular; corollas blue; pappus 2-3 mm, of 5 free scales.

N; Nile and canal banks. Central America, naturalized elsewhere.

NOTE: Täckholm, (1974), p. 547, classifies the above species as a variety of *Ageratum conyzoides*. According to Johnson, Ann. Missouri Bot. Gard. 58: 21-26 (1971), *Ageratum houstonianum* is a distinct species known in several variants. We have examined four specimens (K!), collected from the Nile region in and around Cairo, which belong to *A. houstonianum*, and are readily separated from *A. conyzoides*. Apparently, *A. conyzoides* is the more widespread in Egypt.

## 21. *Grangea* Adans.

Literature: Fayed, A. 1979. Revision der Grangeinae (Asteraceae-Astereae). Mitt. Bot. München 15: 425-576.

Annuals or perennials; leaves oblong-ovate to spatulate, lyrate-pinnatifid or serrate-dentate; capitula solitary or in lax corymbs, disciform; receptacle swollen; outer florets female, 1- to multiseriate, narrowly tubular; central florets perfect, 4- to 5-lobed; corollas yellow; style-branches with short triangular appendages; achenes ellipsoid-obovoid, slightly compressed, pubescent; pappus of few scaly bristles, connate at the base in the form of a corona, or absent. 10 species, tropical and northeast Africa, Madagascar, tropical Asia.

1. *Grangea maderaspatana* (L.) Poir. in Lam., Encycl., Suppl. 2: 825 (1812).  
Syns. *Artemisia maderaspatana* L., Sp. Pl., ed. 1, 849 (1753).  
*Grangea adansonii* Cass., Dict. Sci. Nat. 19: 304 (1821).  
*Grangea aegyptiaca* (Jacq.) DC., Prodr. 5: 373 (1836).

Tomentose annual 15-40 cm, covered with long white hairs; stems ascending or procumbent, branched; leaves 2-6 x 1-3 cm, lyrate-pinnatifid, sessile; lobes oblong, obtuse; capitula c. 8 mm diam., subglobose, terminal or leaf-opposed, nodding, on thin peduncles 0.2-1.2 cm; phyllaries 3-4 mm, 3-seriate, obovate-elliptic, glandular; outer florets female; corollas yellow; achenes c. 1.5 x 0.5 mm, subterete, scabrid; pappus of short curved bristles.

N, O, M; moist ground, Nile and canal banks. Tropical Africa and Asia.

## 22. *Ceruana* Forssk.

Literature: Fayed, A. 1979. Revision der Grangeinae (Asteraceae-Astereae). Mitt. Bot. München 15: 425-576.

Annuals; leaves undivided or coarsely crenate or lobed; capitula disciform, on short stiff peduncles in cymose inflorescences; receptacle paleate; outer florets female, narrowly tubular; central florets perfect; corolla yellow; achenes oblong-obovoid, slightly compressed, pilose; pappus a crown of bristle-like scales, connate at the base. 1 species, Egypt, Sudan, tropical West and Central Africa.

1. *Ceruana pratensis* Forssk., Fl. Aegypt.-Arab. 74 (1775).  
Syns. *Ceruana rotundifolia* Cass., Dict. Sci. Nat. 41: 123 (1826).  
*Buphthalmum pratense* (Forssk.) Vahl, Symb. Bot. 75 (1790).  
*Ceruana fruticosa* Less., Syn. Comp. 202 (1832).  
*Ceruana senegalensis* DC., Prodr. 5: 488 (1836).

Thinly pilose annual 15-60 cm; stems erect, stiff, branched; leaves 3-6 x 1-2 cm, obovate-oblongate, undivided or coarsely crenate or lobed, narrowly auriculate at the base; capitula 6-8 mm diam., campanulate, erect, on short stiff peduncles, subtended by involucre leaves; phyllaries 3-4 mm, dry and chaffy; outer florets female, narrowly tubular, with a rudimentary ligule; corollas dull yellow; receptacle paleaceous; achenes 2 x 1 mm, oblong-obovoid, slightly compressed, angular, pilose; pappus a crown of bristle-like scales, connate at the base.

N, M; moist ground, Nile and canal banks. Distribution as for the genus.

NOTE: The type of *Ceruana pratensis* was collected in Cairo, Egypt, in 1762, Forsskål 1084 (C). It is believed that the basket in which the infant Moses was put into the River Nile was made of *Ceruana pratensis* stems.

### 23. *Felicia* Cass., nom. conserv.

Literature: Grau, J. 1973. Revision der Gattung *Felicia* (Asteraceae). Mitt. Bot. München 9: 195-705.

Annuals, perennials or shrubs; leaves alternate, sometimes opposite, entire or serrate-dentate; capitula often solitary on long peduncles, radiate, occasionally discoid; ray florets female; corollas lilac, blue, violet, or rarely white or yellow; disc florets perfect, occasionally functionally male, with yellow corollas; achenes elliptic-obovoid, compressed, ribbed at the margins, pubescent, eglandular; pappus 1-seriate, of scabrid or barbellate, persistent or caducous bristles, rarely absent in ray florets. About 85 species, South Africa to Nigeria, Ethiopia, Egypt, Arabia.

#### 1. *Felicia dentata* (A. Rich.) Dandy in F. W. Andrews, Fl. Pl. Sudan 3: 29 (1956) subsp. **dentata**

Syns. *Aster abyssinicus* Sch.Bip. in A. Rich., Tent. Fl. Abyss. 1: 383 (1847).

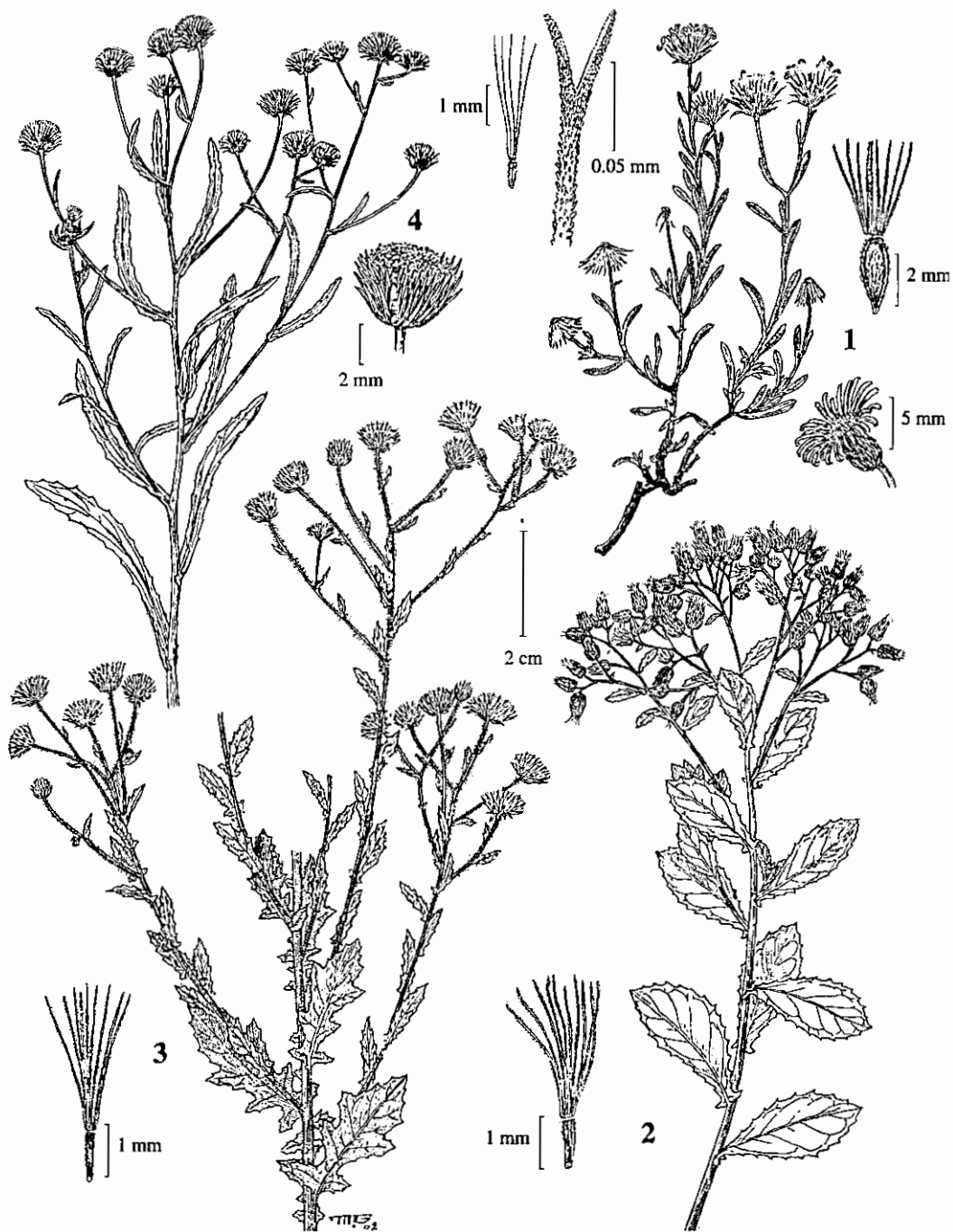
*Agathaea dentata* A. Rich., Tent. Fl. Abyss. 1: 384 (1847).

*Felicia richardii* Vatke, Linnaea 39: 481 (1875).

Hispid low shrub or perennial with woody base, 10-25 cm; stems branched; leaves 1-4 x 0.2-0.5 cm, narrowly oblanceolate, sessile, the margins involute, obscurely dentate or entire, the apex subacute; capitula solitary, radiate; peduncle 2-10 cm, 1-2-bracteate; involucre campanulate; phyllaries 5-8 x 1 mm, 2-seriate, linear-lanceolate, the apex acute, outer phyllaries densely white-hairy, the inner hairy along the midrib, with broad scarious margins; corollas of ray florets lilac; disc florets with yellow corollas; achenes c. 3 x 1 mm, elliptic-obovoid, compressed, thick-margined, hairy; pappus 4-6 mm, of scabrid caducous bristles.

GE; rocky slopes at high altitudes (c. 1,500 m in Egypt, to over 3,000 m in Yemen). Southeast Egypt, northeast Sudan, Ethiopia, Saudi Arabia, Yemen.

NOTE: Grau (1973) recognized two subspecies of *Felicia dentata*: subsp. *dentata* and subsp. *nubica* Grau, Mitt. Bot. München 9: 437 (1973). According to him, (*l. c.*), the latter subspecies is endemic to Jebel Marra, while subsp. *dentata* is known from Saudi Arabia and Ethiopia. We have examined specimens collected from Egypt (Gebel Elba), Sudan and Yemen of subsp. *dentata*, and therefore the geographical distribution of subsp. *dentata* may be extended to accommodate southeast Egypt, northeast Sudan and Yemen.



**Plate 46.** COMPOSITAE: *Felicia dentata* subsp. *dentata* 1, fruiting branch; flowering capitulum (down right); achene (up right). *Pluchea dioscoridis* 2, flowering and fruiting branch; achene (down left). *Pseudoconyza viscosa* 3, flowering and fruiting branch; achene (down left). *Doellia bovei* 4, flowering and fruiting branch; flowering capitulum (middle right); achene and style branches (up right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

## 24. *Pluchea* Cass.

Syns. *Berthelotia* DC., *Eyrea* F. Muell.,  
*Tecmarsis* DC., *Spiropodium* F. Muell.

Literature: King-Jones, S. 2001. Revision of *Pluchea* Cass. (Compositae, Plucheeae) in the Old World. Englera 23: 1-136.

Aromatic shrubs, low shrubs or herbaceous perennials, glabrous or tomentose, often glandular; leaves simple or short-petiolate; capitula sessile or pedunculate, in dense or loose terminal clusters, disciform, heterogamous; involucre multiseriate and closely imbricate; receptacle epaleate, verrucose; marginal florets filiform, usually outnumbering the disc florets; corollas purple or white, 3-4-lobed; disc florets tubular, perfect or functionally male; anthers sagittate, tailed; achenes of disc florets well developed or vestigial; achenes of marginal florets terete, fusiform, slightly sclerified; carpopodium broad or small and ring-shaped; pappus 1-seriate, homomorphic, of 10-30 white capillary bristles, barbellate, persistent or deciduous. About 60 species, tropical and warm regions.

### 1. *Pluchea dioscoridis* (L.) DC., Prodr. 5: 450 (1836).

Syns. *Baccharis dioscoridis* L., Cent. Pl. 1: 27 (1755).

*Conyza odora* Forssk., Fl. Aegypt.-Arab. 148 (1775).

*Conyza dioscoridis* (L.) Desf., Tabl. Ecole Bot., ed. 2, 114 (1815).

*Baccharis aegyptiaca* Forssk. ex DC., Prodr. 5: 450 (1836).

*Pluchea dioscoridis* (L.) DC. var. *glabra* Oliv. & Hiern, Fl. Trop. Afr. 3: 329 (1877).

Puberulent, glandular aromatic shrub 1-3 m; stems branched, leafy; leaves 2-7 x 1-3.5 cm, oblong-elliptic, sessile, the margin serrate, the apex acute; capitula numerous, in terminal compound corymbose inflorescences; involucre 3-4.5 mm; phyllaries 3-4-seriate, 1.5-4 x 0.75-1 mm, the outer 1.5 x 1 mm, ovate, soft-hairy, the margins ciliate, the apex acute to acuminate; inner phyllaries narrowly lanceolate, the margins scarious, successively longer and narrower than the outer; marginal florets 2.75-4 mm; disc florets 3-10, 4-5.5 mm, 5-lobed, the lobes glandular; corollas and stigmas purplish; achenes 0.9-1.1 x 0.2-0.3 mm; pappus c. 2.5 mm, of 10-25 free barbellate deciduous bristles.

N, O, M, De, S; moist ground, canal and Nile banks. Egypt, Palestine, Lebanon, Syria, Iraq, Arabia, Sudan, East and South tropical Africa.

NOTE: The type of *Baccharis dioscoridis* was collected in Egypt by Hasselquist, Herb. Linn. 992 (LINN). The aromatic leaves, with a pleasant scent, were used in Ancient Egypt to perfume ladies' hair plaits. The plant was a burial object in Ancient Egypt, e.g. in the 15th century B.C. grave of Amenophis II, (Schweinfurth 49, B! photo).

## 25. *Pseudoconyza* Cuatrec.

Glandular-pubescent annuals or herbaceous short-lived perennials, without resin canals; stems erect or decumbent, leaves alternate, pinnatisect, serrate or dentate, basally shallowly lobed, amplexicaul, decurrent; capitula disciform, in small lax corymbs on leafy branches; phyllaries 5-6-seriate; outer florets female, filiform, numerous; central florets few, perfect; anthers caudate; achenes oblong-ellipsoid, with straight hairs; pappus of barbellate bristles with appressed teeth, deciduous. 1 species, Africa, Asia, Central America.

1. **Pseudoconyza viscosa** (Mill.) D'Arcy, *Phytologia* 25 (5): 281 (1973).

Syns. *Conyza viscosa* Mill., *Gard. Dict.*, ed. 8, no. 8 (1768).

*Conyza aurita* L.f., *Suppl. Pl.* 367 (1781).

*Conyza lyrata* Kunth, *Nouv. Gen.* 4: 70 (1820).

*Blumea aurita* (L.f.) DC. in Wight, *Contrib. Bot. Ind.* 16 (1834).

*Laggera aurita* (L.f.) C. B. Clarke, *Compositae Ind.* 92 (1876).

*Blumea lyrata* (Kunth) Badillo, *Bot. Soc. Venez. Cienc. Nat.* 10: 257 (1946).

*Pseudoconyza lyrata* (Kunth) Cuatrec., *Ciencia Mexico* 21: 31 (1960).

Viscid, glandular-pubescent aromatic annual, 30-80 cm; stems branched, erect or decumbent, sulcate; leaves 1.5-6 x 0.5-2.5 cm, alternate, the lower lyrate-lobed, decurrent, the lobes serrate; upper leaves ovate-oblongate, clasping, decurrent, smaller, not lobed, serrate; capitula disciform, numerous, in open compound corymbs; peduncle 1-3 cm, bracteate; involucre obconical; phyllaries 5-6-seriate, 2-7 x 0.5-1 mm, pubescent, the outer lanceolate, shortest, progressively longer inwards, the inner scarious-margined, narrowly lanceolate; outer florets female; corollas yellow; anthers caudate; achenes 1 x 0.2 mm, oblong-ellipsoid, sparsely hairy; pappus 4 mm, of fine white barbellate bristles, deciduous.

N (Aswan and Egyptian Nubia); moist ground, Nile banks. Distribution as for the genus.

26. **Doellia** Sch.Bip., emend. Anderb.

Literature: Anderberg, A. A. 1995. *Doellia*, an overlooked genus in the Asteraceae-Plucheeae. *Willdenowia* 25: 19-24.

Herbaceous perennials or low shrubs; stems with resin canals but without fibres in the phloem; leaves alternate, serrate or almost entire, hairy or almost glabrous, auriculate but not decurrent; capitula broadly campanulate, disciform, solitary or few in lax corymbs; phyllaries multiseriate, imbricate, cartilaginous, narrowly linear; receptacle flat, epaleate; outer florets female, outnumbering the bisexual florets; corollas yellow or purplish, 3-lobed, filiform; central florets perfect; corollas yellow or purplish, 5-lobed; anthers tailed; cells of the filament collar flattened, not mamillate; style 2-fid, branches with obtuse sweeping hairs reaching far below the furcation; achenes oblong, rather stout and  $\pm$  angular, sparsely hairy, with a few very conspicuous red resin ducts; epidermal cells without elongated crystals; pappus 1-seriate, of free barbellate capillary bristles; bristles with appressed or erecto-patent teeth and inconspicuous coroniform ridge. 2 species, East and South Africa, Madagascar, Sinai, eastwards to Iran, Afghanistan and Pakistan.

1. **Doellia bovei** (DC.) Anderb., *Willdenowia* 25: 21 (1995).

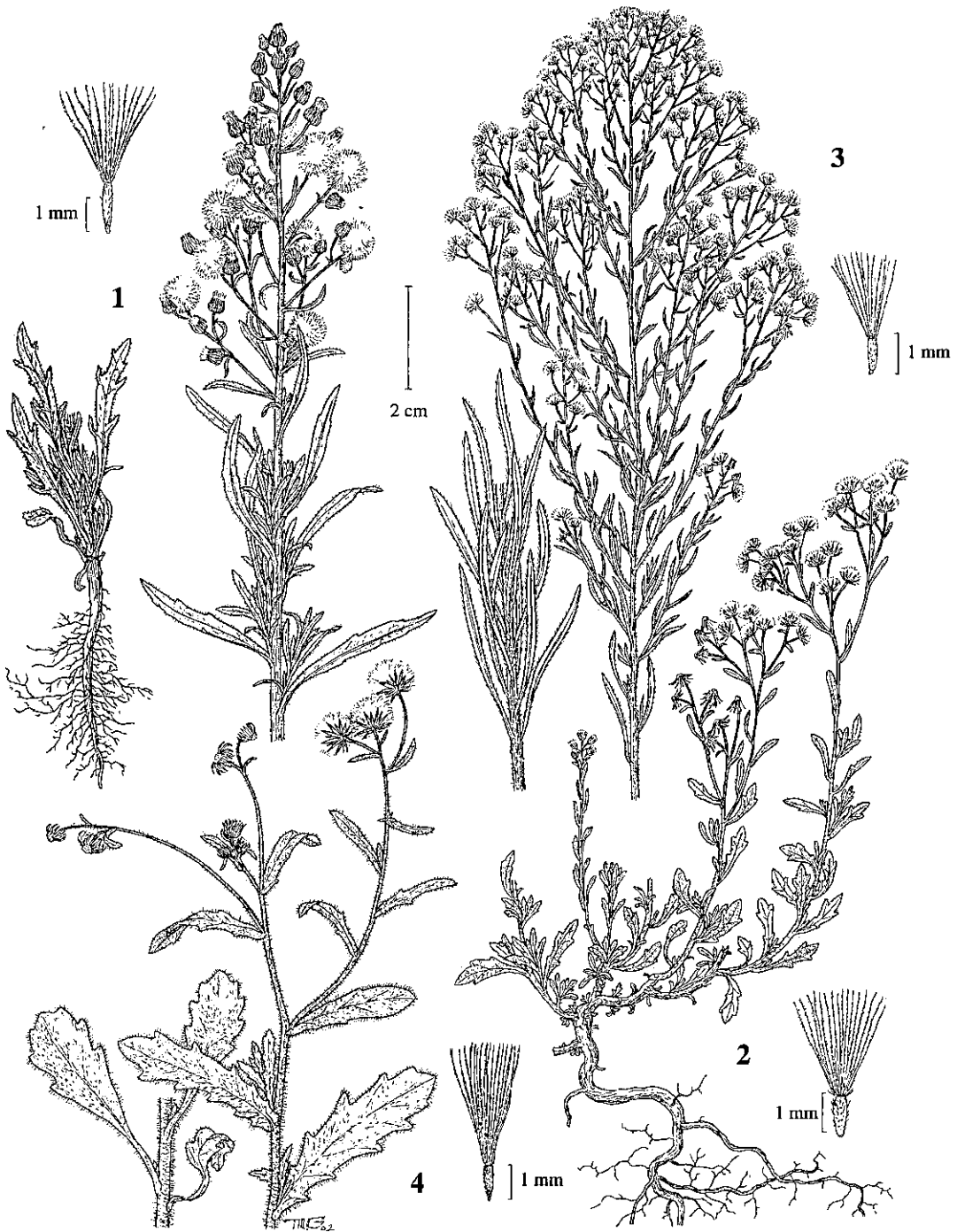
Syns. *Conyza bovei* DC. in Decne., *Ann. Sci. Nat. Bot.*, sér. 2, 1: 261 (1834).

*Blumea abyssinica* Sch. Bip. ex A. Rich., *Tent. Fl. Abyss.* 1: 392 (1847).

*Erigeron bovei* (DC.) Boiss., *Fl. Orient.* 3: 168 (1875).

*Blumea bovei* (DC.) Vatke, *Linnaea* 39: 485 (1875).

Glabrous to glabrescent perennial, 20-50 cm; stems branched from the base, erect or ascending, sulcate; leaves 3-8 x 0.3-1 cm, oblong-lanceolate, sessile, auriculate, obscurely and remotely dentate to entire, the apex subacute; capitula few, in lax corymbs; peduncle 1-8 cm, bracteate, glandular-pubescent above; phyllaries 2-4.5 x 0.5 mm, 3-4-seriate, narrowly lanceolate, glandular-pubescent, the inner scarious-margined, acuminate; outer



**Plate 47. COMPOSITAE:** *Conyza bonariensis* 1, flowering and fruiting branch; basal leaves and root (down left); achene (up left). *Conyza stricta* 2, habit; achene (down right). *Conyza canadensis* 3, flowering and fruiting branch; part of stem with basal cauline leaves (down left); achene (right). *Conyza aegyptiaca* 4, flowering and fruiting branch; branchlet with basal leaves (down left); achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

florets female, outnumbering the bisexual florets; corollas yellow, 3-lobed; central florets perfect, the corollas yellow, 5-lobed; anthers tailed; style 2-fid, branches with obtuse sweeping hairs reaching far below the division; achenes c. 0.75 x 0.2 mm, narrowly oblong, ± angular, sparsely hairy; pappus c. 3.5 mm, 1-seriate, of caducous barbellate capillary white bristles.

O, De, S; moist ground, around wells and springs. Egypt, Palestine, Arabia, Iran, Pakistan, Afghanistan, Sudan, Ethiopia, tropical East Africa.

NOTE: The type of *Conyza bovei* was collected in Sinai, "endroits humides du Sinai", mai 1832, Bové 118 (K!).

## 27. *Conyza* Less., nom. conserv.

Literature: Nesom, G. L. 1990. Further definition of *Conyza* (Asteraceae-Astereae). *Phytologia* 68: 229-233.

Annuals or perennials, rarely shrubs or small trees; leaves entire, dentate or pinnatifid; capitula in corymbose or paniculate inflorescences, rarely solitary, heterogamous, disciform, rarely shortly radiate; outer florets pistillate, numerous, multiseriate, filiform and tubular, sometimes with a short lamina, white or pinkish-purple; central florets perfect, sometimes partly functionally staminate, usually few, yellow or white; style-branch appendages lanceolate to triangular; achenes ovoid-oblong, sometimes compressed, mostly pubescent; pappus of numerous, fine, mostly fragile bristles. About 60 species, tropical and warm regions, some widespread weedy species.

1. Perennial, sometimes flowering in the first year; leaves 3-5-lobed above, tapering at the base 2. *C. stricta*
- + Annual; leaves entire, dentate, regularly incised-dentate, or irregularly incised 2
2. Leaves glabrous or sparsely hairy, the margins ciliate; involucre glabrous or nearly so; pappus 2-2.5 mm 3. *C. canadensis*
- + Leaves densely hairy or villose; involucre densely hairy; pappus 4-5 mm 3
3. Leaves spatulate to oblong-spatulate, all regularly incised-dentate; capitula 1-1.2 cm diam., few; achenes c. 1 mm 4. *C. aegyptiaca*
- + Leaves linear, narrowly linear, entire or lanceolate, dentate to irregularly incised; capitula 2-8 mm diam.; achenes 1.25-1.75 mm 4
4. Cauline leaves 0.5-2 cm broad, obscurely and remotely dentate or entire; capitula 3-4 mm diam. 5. *C. albida*
- + Cauline leaves 1-5 mm broad, entire or irregularly incised; capitula 5-8 mm diam. 1. *C. bonariensis*

1. *Conyza bonariensis* (L.) Cronquist, Bull. Torrey Bot. Club 70: 632 (1943).

Syns. *Erigeron bonariensis* L., Sp. Pl., ed. 1, 863 (1753).

*Erigeron crispus* Pourr., Mém. Acad. Sci. Toulouse 3: 318 (1788).

*Erigeron linifolium* Willd., Sp. Pl., ed. 4, 3: 1955 (1803).

*Conyza ambigua* DC., Prodr. 5: 381 (1836).

*Conyza linifolia* (Willd.) Täckh., Stud. Fl. Egypt, ed. 1, 53 (1956), nom. ambig.



Greyish pubescent annual 30-80 cm, with appressed and spreading hairs; stems erect, leafy, branched, sulcate; cauline leaves 2-8 x 0.1-0.5 cm, the lower oblong-lanceolate, entire or irregularly incised, tapering into a petiole, the upper narrowly linear; capitula 5-8 mm diam., numerous, in open panicles; involucre 5 mm; phyllaries 2-5 x 0.5 mm, 2-3-seriate, linear-lanceolate, hairy, acuminate, the inner scarious-margined; female florets filiform; corollas whitish; bisexual florets c. 6; corollas yellowish; achenes 1.5-1.75 x 0.25 mm, sparsely hairy; pappus 3 mm, of barbellate bristles.

N, O, M, D, S; widespread weed of cultivated and waste ground, roadsides. Native to South America, naturalized in many regions of the Old World, especially the Mediterranean region and western Europe.

2. *Conyza stricta* Willd., Sp. Pl., ed. 4, 3: 1922 (1803).

Syns. *Conyza triloba* Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 261 (1834).

*Erigeron trilobum* (Decne.) Boiss., Fl. Orient. 3: 168 (1875).

Appressed-pubescent perennial with woody base, sometimes flowering in the first year, 20-50 cm; stems branched from the base, sulcate; leaves 1-5 x 0.2-1 cm, obovate-spathulate, 3-5-lobed above, tapering at the base, the lobes mucronate; capitula numerous in a compound corymbose inflorescence; involucre 3 mm; phyllaries 2-3 x 0.5 mm, 2-3-seriate, linear-lanceolate, setulose, the inner scarious; pistillate florets filiform, 3-dentate; corollas yellow; achenes 0.8-1 x 0.4 mm; pappus 2.5-3 mm, of deciduous bristles.

GE, S; rocky hillsides. Egypt, Palestine, Arabia, eastwards to India and China, Sudan, Ethiopia, tropical Africa.

3. *Conyza canadensis* (L.) Cronquist, Bull. Torrey Bot. Club 70: 632 (1943).

Syn. *Erigeron canadense* L., Sp. Pl., ed. 1, 863 (1753).

Annual 0.3-1.2 m, glabrous or sparsely hairy; stems erect, branched or not, densely leafy, sulcate; leaves 1-4 x 0.1-0.3 cm, linear-lanceolate, glabrous or sparsely hairy, the margins ciliate, the apex acute; capitula 3-4 mm, numerous in dense panicles; involucre glabrous or nearly so; phyllaries 2-3 mm, 3-4 seriate, oblong-lanceolate, acuminate, the inner scarious; female florets all ligulate; corollas pale pink to white; bisexual florets 12-18; corollas yellowish; achenes c. 1 x 0.25 mm, hirtellous; pappus 2-2.5 mm, of fine deciduous bristles.

S; waste ground, edges of cultivation. Native to North and South America, widely naturalized in temperate regions.

NOTE: *Conyza canadensis* is restricted to a few localities in northern Sinai.

4. *Conyza aegyptiaca* (L.) Dryand. in Aiton, Hort. Kew., ed. 1, 3: 254 (1789).

Syns. *Erigeron aegyptiacum* L., Mant. 112 (1767).

*Erigeron serratum* Forssk., Fl. Aegypt.-Arab. 148 (1775).

*Conyza lineariloba* DC., Prodr. 5: 385 (1836).

Greyish-hirsute and pilose annual, 30-80 cm; stems erect, branched, leafy, sulcate; leaves 2-6 x 0.5-1.5 cm, spathulate to oblong-spathulate, sessile, all regularly incised-dentate, auriculate; capitula 1-1.2 cm diam., few at the ends of the stems; peduncle 1-3 cm, bracteate; phyllaries 3-5 x 0.75 mm, 2-3-seriate, linear-lanceolate, the outer hairy, the

inner scarious-margined and hairy along the midrib, the apex acuminate and purplish; corollas pale yellow; achenes c. 1 x 0.25 mm, thinly pubescent; pappus c. 3.5 mm, of fine bristles.

N, O; moist ground, Nile and canal banks. Egypt, Libya, Sudan, Ethiopia, tropical Africa, Arabia, eastwards to Afghanistan and India.

NOTE: The type of *Erigeron aegyptiacum* was collected in Egypt.

#### 5. *Conyza albida* Willd. ex Spreng., Syst. Veg. 3: 514 (1826).

Greyish-green appressed-hairy annual, 0.5-1.5 m, with longer spreading hairs; stems branched or not, erect, sulcate; lower leaves 8-12 x 2-3.5 cm, rosulate, oblong-ovate to lanceolate, petiolate, dentate or incised; cauline leaves 2-6 x 0.5-2 cm, linear-lanceolate, obscurely and remotely dentate or entire; capitula 3-4 mm diam., numerous, in compound corymbs to 40 cm; peduncle 0.2-1.8 cm, bracteate, densely hairy; phyllaries 2-4 x 0.5 mm, 3-4-seriate, linear-lanceolate, the outer hairy, the inner scarious, acuminate; female florets c. 150, ligulate; corollas whitish; bisexual florets c. 15; corollas yellow; achenes c. 1.5 mm; pappus 3-4 mm, yellowish-brown.

S; edges of cultivation. Native to South America, naturalized in many temperate regions of the Old World.

### 28. *Symphotrichum* Nees

Syns. *Lasallea* Greene, *Aglotoma* Raf., *Virgulus* Raf., *Virgulaster* Semple, *Conyzanthus* Tamamsch., *Fimbristima* Raf., *Mesoligus* Raf., *Brachyactis* Ledeb.

Literature: Nesom, G. L. 1994. Review of the taxonomy of *Aster* sensu lato (Asteraceae: Astereae), emphasizing the New World species.

Rhizomatous herbaceous perennials, rarely annuals or biennials, with taproots; leaves simple, alternate, petiolate to sessile and clasping; capitula in paniculate inflorescences, sometimes corymboid; involucre narrowly campanulate to subglobose; phyllaries 3-7-seriate, mostly with whitish indurate base and herbaceous apex; receptacle epaleate; ray florets female, fertile; corollas white, blue or purplish; disc florets perfect, fertile; corollas yellow, usually purplish at maturity; style-branches with lanceolate collecting appendages; achenes narrowly obovoid, slightly flattened, sparsely strigose to glabrous; pappus 1-(2-)seriate, of numerous barbellate bristles. About 100 species, mainly New World, but especially North America, several species widely naturalized in the Old World.

#### 1. *Symphotrichum squamatum* (Spreng.) Nesom, Phytologia 77: 292 (1994).

Syns. *Conyza squamata* Spreng., Syst. Veg., ed. 16, 3: 515 (1826).

*Aster squamatus* (Spreng.) Hieron., Engl. Bot. Jahrb. 29: 19 (1900).

*Conyzanthus squamatus* (Spreng.) Tamamsch., Fl. URSS 25: 186 (1959).

*Aster subulatus* Michx., Fl. Bor. Amer. 2: 111 (1803) var. *sandwicensis* (A. Gray) A. G. Jones, Brittonia 36: 465 (1984).

Glabrous annual or biennial, 0.5-1.2 m; stems much-branched, erect, sulcate, becoming stiff and frutescent before drying; leaves 2-12 x 0.2-2 cm, the lower linear-oblongate, clasping; upper linear, smaller, sessile, the apex obtuse to acute; capitula numerous, in

richly branched panicles; phyllaries 2-4.5 x 0.5 mm, 3-seriate, narrowly lanceolate to linear, glabrous, the outer green, the inner scarious-margined with a green midrib; apex mucronate, often tinged purple; ligulate florets outnumbering the tubular; corollas violet-blue; achenes c. 2 x 0.4 mm, narrowly oblong, slightly compressed, brownish, thinly pilose; pappus 4-5 mm, persistent.

N, O, M, D, S; weed of cultivation, roadsides, waste ground, canal banks. Native to Central and South America, naturalized in southern Europe, Africa, Arabia and many other regions of the world.

NOTE: This species, introduced into Egypt in the 1970s, is now completely naturalized and one of the most widespread and noxious weeds in the country.

## 29. *Sphaeranthus* L.

Literature: Ross-Craig, S. 1955. A revision of the genus *Sphaeranthus*, Hooker's *Icones Plant.*, ser. 5, 6: 1-117.

Annual or perennial herbs; leaves dentate, long-decurrent; capitula small, congested in dense globose or ovoid, terminal secondary disciform capitula; outer florets female, filiform, becoming suberized basally; central florets functionally male; style undivided; achenes often vestigial, often hairy with uncinata or anchor-shaped hairs; pappus absent. About 40 species, tropical and subtropical Africa, Asia and Australia.

### 1. *Sphaeranthus suaveolens* (Forssk.) DC., Prodr. 5: 370 (1836).

Syn. *Polycephalos suaveolens* Forssk., Fl. Aegypt.-Arab. 154 (1775).

Glabrous perennial herb 15-60 cm; stems erect or procumbent, often rooting in the lower part, branched, winged, the wings dentate; leaves 1.5-10 x 0.3-3.5 cm, oblong to oblong-elliptic or -lanceolate, decurrent and forming the wings of the stems, the margins serrate; capitula 1-2 cm diam., broadly ovoid or globose; peduncle 0.5-6 cm, winged, bracteate; secondary capitula sessile, bracteate; female florets 8-12, 2.5-4 mm; corollas white, pink or violet, subulate or flask-shaped, tapering to a long neck; ovary hirsute; style deeply 2-fid; bisexual florets 2-4, 3-4.5 mm; corollas narrow at the base, inflated upwards; stamens shorter than the corolla-lobes; ovary thin and scarious, sterile; achenes c. 1 x 0.25 mm, oblong-ellipsoid, thinly pilose.

Two varieties occur in Egypt:

#### var. *suaveolens*

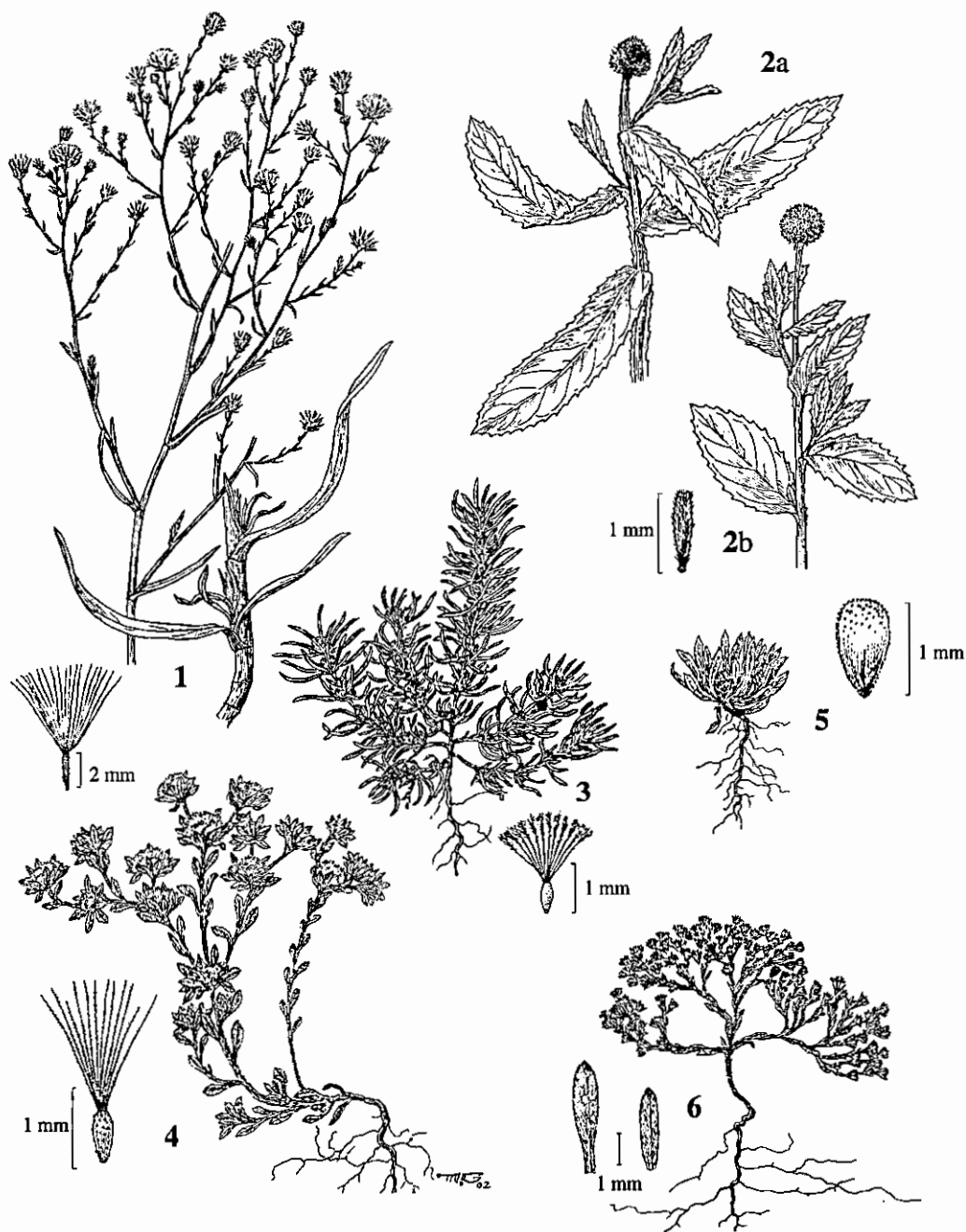
Leaves 3.5-10 x 0.8-2 cm, oblong to oblong-elliptic, or oblong-lanceolate; female florets 8-11, 3-4 mm, white or pink; bisexual florets 4-4.5 mm.

N, M, De (Suez); moist ground, Nile and canal banks. Egypt, Ethiopia, Kenya, Tanzania.

#### var. *abyssinicus* (Steetz) Ross-Craig, Hooker's Icon. Pl., ser. 5, 6: 44 (1955).

Syns. *Sphaeranthus abyssinicus* Steetz in Peters, Naturw. Reise Mossamb. 2: 411 (1864).

*Sphaeranthus kotschyi* Schweinf., Beitr. Fl. Aethiop. 308 (1867).



**Plate 48. COMPOSITAE:** *Symphyotrichum squamatum* 1, flowering and fruiting branch, and lower part of the stem with leaves; achene (down left). *Sphaernathus suaveolens* var. *suaveolens* 2a, flowering branch. *Sphaernathus suaveolens* var. *abyssinicus* 2b, flowering branch; achene (down left). *Ifloga spicata* 3, habit; achene (down right). *Filago desertorum* 4, habit; achene (left). *Filago contracta* 5, habit; achene (up right). *Filago mareotica* 6, habit; lower (longer) and upper leaves (down left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

Leaves 2-5.5 x 1-2.2 cm, elliptic to oblong-elliptic; female florets 12-15, 2.5-3 mm, violet; bisexual florets 3 mm.

N, moist ground, Nile and canal banks. Egypt, Sudan, Ethiopia, Eritrea, Kenya, Uganda, Tanzania, Congo, Malawi.

NOTE: The type of *Sphaeranthus suaveolens* var. *suaveolens*, based on material of *Polycephalos suaveolens*, was collected in Rosetta, "Roseitae in littore Nili", November 1761, Forsskål 1588 (C).

30. **Ifloga** Cass.  
Syn. *Comptonanthus* B. Nord.

Literature: Hilliard, O. M. 1981. A revision of *Ifloga* in southern Africa, with special comments on the northern hemisphere species. Bot. J. Linn. Soc. 82: 293-312.

Fayed, A. & Zareh, M. 1988. Systematic revision of Compositae in Egypt. 3. Inuleae: *Filago* and *Ifloga*. Willdenowia 17: 115-123.

Ericoid annuals; leaves sessile, involute, tomentose; capitula disciform, few together along an axis; phyllaries brownish; stereome divided; bracts at the base of the capitulum generally absent; outer florets often purple, female, often subtended by the outer phyllaries, generally outnumbering the central florets; central florets perfect or rarely functionally male; corollas yellow; achenes with globose myxogenic twin hairs; pappus of bristles plumose at the apex. 6 species, Canary Islands, North and South Africa, southwest Asia.

1. Leaves linear-lanceolate or narrowly linear; capitula 3.5-4 mm;  
female florets longer than the bisexual  
+ Leaves acicular; capitula 2-3 mm; female florets shorter than  
the bisexual

1. **I. spicata**

2. **I. labillardieri**

1. **Ifloga spicata** (Forssk.) Sch.Bip. in Webb & Berthel., Phyt. Canar. 2: 310 (1845).  
Syns. *Chrysocoma spicata* Forssk., Fl. Aegypt.-Arab. LXXIII (1775).  
*Chrysocoma spicatum* (Forssk.) Vahl, Symb. Bot. 1: 70 (1790).

Yellowish-green or greyish-woolly annual, 3-15 cm; stems branched from the base; leaves 0.5-2 x 0.05-0.2 cm, linear-lanceolate or narrowly linear, woolly on both surfaces or lower surface glabrous to glabrescent, the margins involute, the apex acute; capitula 2-3 in the leaf-axils, c. 3.5 mm, sessile, forming a dense spicate inflorescence, intermixed with leaves; phyllaries 3-4-seriate, 1-3 x 1 mm, broadly ovate to lanceolate, with scarious margin; outer phyllaries golden-yellow or whitish, ending in a spinule 0.5-1.5 mm; female florets longer than the bisexual florets; achenes 0.5-0.6 x 0.25 mm; pappus c. 1.5 mm, of bristles plumose at the apex.

Three subspecies occur in Egypt:

1. Leaves 1.5-2 cm, narrowly linear  
+ Leaves 1-1.2 cm, linear-lanceolate

subsp. **elbaensis**  
2

2. Outer phyllaries golden-yellow, ending in a spinule 0.5-1 mm  
+ Outer phyllaries whitish, ending in a spinule 1.2-1.4 mm

subsp. **spicata**  
subsp. **albescens**

subsp. **spicata**

D, S; sandy wadis and desert plains.

subsp. **albescens** Chrtek, Preslia 41: 243 (1969).

Syns. *Gnaphalium rueppellii* Fresen., Mus. Senckenb. 1: 79, t. 4, f. 1 (1834).  
*Ifloga rueppellii* (Fresen.) Danin, Notes Roy. Bot. Gard. Edinb. 32: 269  
(1972).

De, R, GE, S; sandy wadis and desert plains.

subsp. **elbaensis** Chrtek, Preslia 41: 243 (1969). Endemic.

GE; sandy and rocky ground.

Area of the species: Canary Islands, Mediterranean region, southwest Asia.

NOTE: The type of *Ifloga spicata* subsp. *spicata*, based on material of *Chrysocoma spicata*, was collected in the Cairo desert in 1763, Forsskål 1107 (C; K, photo!).

2. ***Ifloga labillardierei*** (Pamp.) Fayed & Zareh, Willdenowia 17: 122 (1988).

Syn. *Ifloga spicata* (Forssk.) Sch.Bip. var. *labillardieri* Pamp., Nuovo Giorn.  
Bot. Ital. 36: 245 (1929).

Like *Ifloga spicata* but leaves acicular, strongly involute; capitula 2-3 mm; female shorter than the bisexual florets.

Two subspecies occur in Egypt:

subsp. **labillardierei**

Leaves to 1.8 cm; phyllaries acuminate; bisexual florets c. 25 per capitulum.

M, Dw; sandy desert plains and wadis.

subsp. **hadidii** Fayed & Zareh, Willdenowia 17: 122 (1988).

Leaves to 1.2 cm; phyllaries acute; bisexual florets c. 15 per capitulum.

M, De, S; sandy desert plains and wadis.

Area of the species: Egypt, ? Palestine, ? tropical East Africa.

### 31. **Filago** L.

Syn. *Evax* Gaertn.

Literature: Wagenitz, G. 1969. Abgrenzung und Gliederung der Gattung *Filago* L. s.l. (Compositae) - Inuleae. Willdenowia 5: 395-444.

Fayed, A. & Zareh, M. 1988. Systematic revision of Compositae in Egypt. 3. Inuleae: *Filago* and *Ifloga*. Willdenowia 17: 115-123.

Annuals; leaves sessile, tomentose; capitula disciform, few together, surrounded by a ruff of leaves; phyllaries 1-multiseriate, chartaceous or apically minutely papery, not

enclosing the florets; outer florets female, outnumbering the central; corollas purple; achenes sparsely hairy; pappus of scabrous bristles. About 50 species, Europe, North Africa, Asia, North America.

- |   |   |
|---|---|
| 1. Phyllaries obovate; achenes epappose<br>+ Phyllaries lanceolate; achenes paplose   | 3. <b>F. contracta</b><br>2                       |
| 2. Capitula solitary, ovoid; inner florets 4-5, all bisexual<br>+ Capitula aggregated into glomerules, subglobose or oblong-ovate;<br>inner florets more than 20, female and bisexual | 4. <b>F. mareotica</b><br>3                       |
| 3. Outer rim of the inner phyllaries long-ciliate<br>+ Outer rim of the inner phyllaries not ciliate  | 1. <b>F. desertorum</b><br>2. <b>F. prolifera</b> |

1. **Filago desertorum** Pomel, *Nouv. Mat. Fl. Atlant.* 1: 46 (1874).  
Syns. *Filago spathulata* C. Presl forma *desertorum* (Pomel) Pamp., *Atti R. Ist. Ven. Sci. Lett. Arti* 92: 234 (1932).  
*Evax mauritanica* Pomel var. *cyrenaica* Pamp., *Nuovo Giorn. Bot. Ital.*, n. s., 34: 962 (1927).

Greyish-tomentose annual 5-15 cm; stems branched from the base, the primary stem often very short and ending in a glomerule; leaves 0.5-1.2 x 0.2-0.4 cm, spatulate, mucronate; floral leaves equalling or slightly longer than the glomerules; glomerules 0.8-1 cm diam., numerous, subglobose, consisting of 6-12 capitula; capitula 3 x 2 mm, ovoid, woolly-tomentose; phyllaries 4-5(-7)-seriate, ovate-lanceolate, acuminate, scarious except along the green midrib; outer and middle phyllaries woolly, ending in a spinule 1-2 mm; outer rim of the inner phyllaries long-ciliate; receptacle flat; florets c. 2 mm; achenes 0.5-0.75 x 0.25 mm, the inner paplose; pappus c. 2 mm, of c. 10 scabridulous bristles.

M, D, R, S; desert wadis and plains. Southern Spain, North Africa, East Mediterranean region, Sinai, Arabia, Iraq, Iran, Pakistan.

2. **Filago prolifera** Pomel, *Nouv. Mat. Fl. Atlant.* 1: 47 (1874).  
Syns. *Filago germanica* L. subsp. *prolifera* (Pomel) Maire, *Cat. Pl. Maroc* 3: 746 (1934).  
*Filago prolifera* Pomel subsp. *taeckholmiana* Chrtek in Täckh., *Stud. Fl. Egypt*, ed. 2, 554 (1974), nom. nud.

Dwarf grey-tomentose annual; main stem absent, the primary glomerule borne at the ground level, the branches prostrate; leaves 0.6-1.5 x 0.2-0.4 cm, linear-oblongate, in a rosette below the primary glomerule; glomerules with 2-8 capitula, ± equalling the subtending leaves; phyllaries 3-5-seriate, pale brown, the inner widely spreading in fruit, not ciliate on the outer rim.

GE; stony ground. North Africa, southeast Egypt, Arabia.

3. **Filago contracta** (Boiss.) Chrtek & Holub, *Preslia* 45: 3 (1963).  
Syn. *Evax contracta* Boiss., *Diagn. Pl. Orient.*, ser. 1, 11: 3 (1849).

Dwarf greyish-tomentose annual, 5-10 cm, stemless or sometimes with prostrate branches; leaves 2-3.5 x 0.2-0.5 cm, basal in a rosette, oblongate to spatulate, much

exceeding the subtended glomerule, the apex mucronate, dilated and indurate at the clasping base; glomerules usually 1, 1-1.5 cm diam., compact; capitula 5-6 x 3-4 mm, oblong-cylindrical; phyllaries 6-8-seriate, the outer 4 x 2 mm, ovate, aristate, the inner shorter oblong-obovate, glabrous, not spreading; female florets 2 mm, filiform; bisexual florets 2 mm, tubular, 4-lobed; achenes 1-1.25 x 0.5 mm, obovoid, papillose, epappose.

M, De, S; stony and sandy ground. North Africa, Sinai, Palestine, Lebanon, Syria, Turkey, Aegean Islands, Cyprus, Arabia, Iraq, Iran.

4. **Filago mareotica** Delile, Descr. Egypte, Hist. Nat. 274, t. 47, f. 2 (1814).

Syns. *Filago mareotica* Delile var. *floribunda* (Pomel) Maire, Bull. Soc. Hist. Nat. Afr. Nord 26: 209 (1935).

*Gifolaria mareotica* (Delile) Chrtek & Holub, Preslia 35: 10 (1963).

Greyish-tomentose annual 2-10 cm; stems erect, sparsely or much-branched; leaves 2-5 x 0.5-1.5 mm, oblong-oblongeolate to linear, obtuse, sessile, clasping; capitula 3-4 x 2-3 mm, ovoid, solitary, sessile, in dichotomous cymes; phyllaries 3-5, 2.5 x 1.5 mm, 1-seriate, ovate, acute, keeled, scarious-margined; female florets c. 1.2 mm; inner florets 4-5, 1 mm, all bisexual; achenes c. 0.75 mm, brownish, sparsely papillose, epappose.

M; around salt-marshes. Tunisia, Libya, Egypt, Cyprus.

NOTE: The type of *Filago mareotica* was collected in Mariut, Egypt, "auprès des anciennes carrières d'Alexandrie et du lac Maréotis", Delile *s.n.* (MPU).

#### **Imperfectly known species:**

**Filago pyramidata** L., Sp. Pl., ed. 1, 1199 (1753).

Syns. *Filago spathulata* C. Presl, Delic. Prag. 99 (1822).

*Filago germanica* L. var. *pyramidata* (Gaudin.) DC., Prodr. 6: 247 (1838).

*Filago germanica* L. var. *spathulata* (C. Presl) DC., Prodr. 6: 247 (1838).

Grey-tomentose erect annual, 5-20 cm; stems branched or not; leaves 0.6-2.5 x 0.2-0.6 cm, oblong, sessile, obtuse; capitula numerous, in terminal inflorescences on dichotomous branches equalling or exceeding floral leaves; phyllaries 5-seriate, 4-5 x 1.5 mm, narrowly ovate, acuminate, scarious-margined, yellowish; female florets 3 mm, filiform; central florets female and bisexual; achenes 0.75 x 0.4 mm, obovoid, brownish, smooth or thinly papillose.

NOTE: The distribution of *Filago pyramidata* strongly suggests that it occurs in Egypt, since it is known from Morocco, Algeria, Tunisia, Libya, Palestine, Lebanon, Syria, Turkey, Cyprus, Arabia, Iraq, Iran, Pakistan.

### 32. **Gymnarrhena** Desf.

Literature: Dittrich, M. in Heywood, V. H., Harborne, J. B. & Turner, B. L. (eds). 1977. The Biology and Chemistry of the Compositae 2, Cynareae - Systematic review: 999-1015. Academic Press, London.

Glabrous, stemless annual; leaves narrowly lanceolate, forming a rosette; capitula congested into dense glomerules in the centre of the leaf rosette, homogamous and female or heterogamous, disciform; homogamous female capitula subterranean; heterogamous disciform capitula with outer female florets and functionally male central florets; outer female florets filiform, basally suberized with age; central functionally male florets 3-4-lobed; subterranean achenes flattened, blackish, epappose or of short



triangular scales; overground achenes from outer female florets obconical, villose with pappus of long ciliate scales. 1 species, North Africa, Sinai, Palestine, Lebanon, Syria, Arabia, Iraq, Iran.

1. *Gymnarrhena micrantha* Desf., Mém. Mus. Hist. Nat. (Paris) 4: 1, t. 4 (1818).

Dwarf glabrous annual, with a few short branches from the base; leaves 3-8 x 0.5-1.5 cm, oblong-lanceolate, entire or obscurely dentate-serrate, forming a rosette, surrounding and much overtopping the dense glomerules; capitula 3-8 in each glomerule; involucre campanulate, exceeding the florets; receptacle plano-convex, paleaceous; overground achenes from pistillate florets 1 x 0.5 mm, obconical, villous, with pappus 3-4 mm of ciliate scales; subterranean achenes 3 x 1 mm, flattened, blackish, epappose or of short triangular scales.

M, D, S; alluvial and sandy plains and wadis. Distribution as for the genus.

NOTE: In the recent generic treatment of the Compositae (Bremer, 1994), *Gymnarrhena* was simply placed in the subfamily Cichorioideae and left unassigned to a tribe. This monotypic genus has habit affinities with the Inuleae, although pollen characters suggest a greater affinity with the Cardueae; Dittrich (1977) excluded the genus from the Cardueae.

33. *Lasiopogon* Cass.

Literature: see reference under *Homognaphalium* Krip., p. 205.

Annuals; leaves sessile, woolly; capitula disciform, minute, few together; phyllaries brownish; stereome divided; outer florets female, with purple corollas, outnumbering central florets; central florets with purple corollas; achenes often with 1-celled globose myxogenic twin hairs; sometimes glabrous; pappus-setae barbellate or plumose, with relatively very long side branches; apical cells generally clavate. 8 species, mainly South Africa, 1 species, North Africa and southwest Asia.

1. *Lasiopogon muscoides* (Desf.) DC., Prodr. 6: 246 (1838).

Syn. *Gnaphalium muscoides* Desf., Fl. Atlant. 2: 267, t. 231 (1799).

Delicate annual 2-8 cm, densely woolly-floccose; stems much-branched from the base, the branches prostrate; leaves 0.2-1.2 x 0.1-0.3 cm, spatulate, tapering to a petiole; involucre leaves equalling the glomerules; glomerules numerous, terminal, densely woolly, each comprising several capitula; phyllaries 2-3-seriate, 1.5-2 x 0.25 mm, oblong-linear, obtuse, subequal, with broad scarious margins; female florets 1.5 mm, tubular; bisexual florets 2 mm; achenes c. 0.5 x 0.2 mm, 4-angled; pappus 1.5-2 mm, of plumose setae with relatively long side branches.

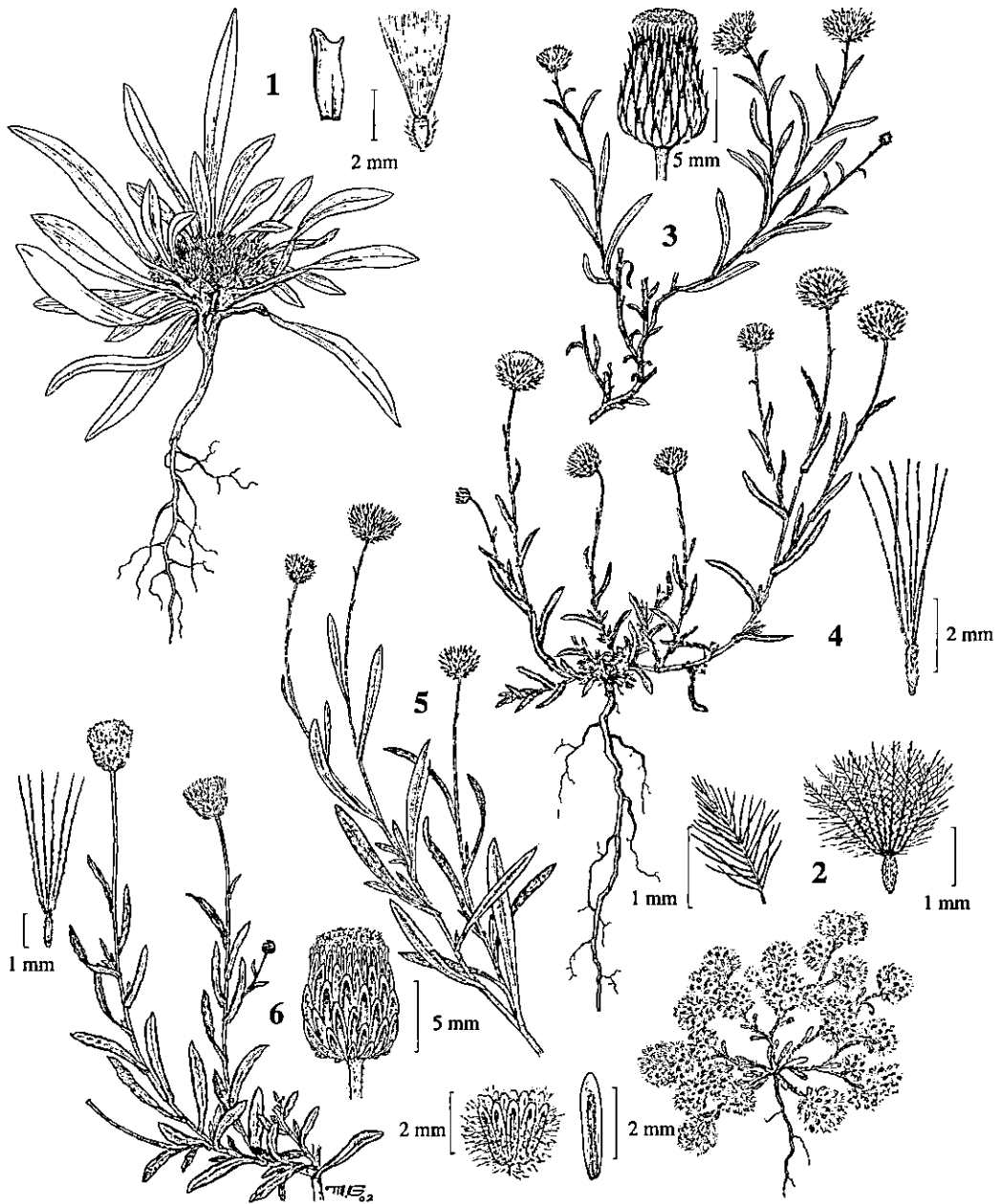
M, D, S; desert wadis, sheltered crevices. North Africa, Sinai, Palestine, Lebanon, Syria, Arabia, Iraq, Iran.

34. *Phagnalon* Cass.

Literature: Qaiser, M. & Lack, H. W. 1986. The genus *Phagnalon* (Asteraceae, Inuleae) in Tropical Africa. Willdenowia 15: 437-450.

Fayed, A.-A. 1991. Systematic revision of Compositae in Egypt. 7. Tribe Inuleae: *Phagnalon* and *Leysera*. Willdenowia 20: 97-102.

Perennials or low shrubs; leaves sessile, the margins revolute, dentate; capitula solitary



**Plate 49. COMPOSITAE:** *Gymnarrhena micrantha* 1, habit; two types of achenes (up right). *Lasiopogon muscoides* 2, habit; capitulum and phyllary (down left); achene and plumose pappus seta (up). *Phagnalon sinaicum* 3, fruiting branch; capitulum (within). *Phagnalon barbeyanum* 4, habit; achene (right). *Phagnalon schweinfurthii* 5, fruiting branch. *Phagnalon rupestre* 6, flowering and fruiting branch; flowering capitulum (middle right); achene (up left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

or few together, disciform; phyllaries often papery at the apex; corollas yellow; outer florets filiform, multiseriate, outnumbering the perfect central florets; anthers without tails; style-branches sparsely hairy; pappus bristles 1-seriate, barbellate, connate at the base, several times as long as the achene. About 40 species, Macaronesian Islands, Europe, North Africa, southwest Asia.

- |   |                             |
|---|-----------------------------|
| 1. Leaves green on both surfaces; leaves, stems and peduncles<br>stipitate-glandular  | 1. <b>P. sinaicum</b>       |
| + Leaves white-woolly at least beneath; plant eglandular  | 2                           |
| 2. Outer phyllaries suborbicular, broadly scarious-margined   | 2. <b>P. nitidum</b>        |
| + Outer phyllaries oblong to lanceolate, not or narrowly scarious-margined  | 3                           |
| 3. All phyllaries glabrous, glossy  | 5. <b>P. rupestre</b>       |
| + Outer phyllaries floccose   | 4                           |
| 4. Leaves 1-2.5 x 0.1-0.25 cm, linear, the margins sinuate-revolute;<br>achenes 1.5-1.8 mm; pappus 7-9 mm                                 | 3. <b>P. barbeyanum</b>     |
| + Leaves 2.5-6 x 0.25-0.6 cm, narrowly oblanceolate, the margins not sinuate,<br>not or slightly revolute; achenes c. 1 mm; pappus 5-7 mm | 4. <b>P. schweinfurthii</b> |

1. **Phagnalon sinaicum** Bornm. & Kneuck., Allg. Bot. Z. Syst. 12: 69 (1906).

Low shrub 15-30 cm; stems much-branched; young stems and leaves green, stipitate-glandular; leaves 1.5-3.5 x 0.1-0.3 cm, linear-lanceolate to linear, sessile and clasping at the base, the apex acute to acuminate, the margins revolute; peduncle 1.5-5 cm; capitula solitary; involucre 1-2-1.5 cm diam.; phyllaries multiseriate, glabrous, purplish towards the apex, the outer 2-2.5 x 1 mm, ovate-lanceolate, acute; middle phyllaries 4-5 x 1-1.5 mm, spatulate, with a broad scarious margin at the acute apex; inner phyllaries 6-8 x 0.5-0.75 mm, narrowly linear-lanceolate, acuminate; bisexual florets 7-8 mm; corollas yellow, the limb 5-lobed; lobes recurved, hairy at the apex on the outer side, papillose on the inner; stamens exerted; anthers with rounded bases, without tails; achenes 1.2-1.4 mm; pappus 7-8 mm, of scabrous bristles.

S; stony ground. Sinai, Saudi Arabia.

NOTE: The type of *Phagnalon sinaicum* was collected in Pass Lethi, Sinai, 3 May 1904, Kneucker s. n. (B, lectotype).

2. **Phagnalon nitidum** Fresen., Mus. Senckenb. 3: 81 (1839).

White-tomentose perennial 10-30 cm; stems much-branched from the woody base, densely white-woolly; leaves white-tomentose on the lower surface, greenish and sparsely hairy on the upper; lower leaves 1.5-4 x 0.2-0.3 cm, narrowly spatulate, attenuate into a petiole, the base clasping, the apex obtuse; cauline leaves 2-4 x 0.1-0.2 cm, linear to narrowly linear-oblanceolate, the margins revolute, the midrib prominent on the lower white-tomentose surface; peduncle 3-8 cm; capitula solitary; involucre 1.2-1.5 cm diam.; phyllaries multiseriate, glabrous, the outer 2-3 x 2-3 mm, suborbicular, broadly scarious-margined; middle phyllaries 4-5 x 1-1.5 mm, oblanceolate, acute, scarious-margined; inner phyllaries 4.5-5.5 x 0.5-1 mm, linear-lanceolate, acuminate, scarious except at the midrib; bisexual florets 7-8 mm; corollas yellow, 5-lobed; achenes c. 1 mm; pappus 6-7 mm, of scabrous bristles.

De, S; desert wadis, rocky crevices. Endemic.

NOTE: The type of *Phagnalon nitidum* was collected in the mountainous region of southern Sinai.

3. ***Phagnalon barbeyanum*** Asch. & Schweinf., Mém. Inst. Egypt. 2: 87 (1887).  
Syn. *Phagnalon aegyptiacum* Boiss., Fl. Orient. Suppl. 296 (1888).

Appressed white-woolly perennial, 20-40 cm; stems ascending, much-branched from the woody base, densely white-woolly; leaves 1-2.5 x 0.1-0.25 cm, linear, margins revolute, the apex acute, the base clasping, densely hairy beneath, subglabrous on the upper surface; peduncle 3-8 cm; capitula solitary; involucre 1.2-1.6 cm diam.; phyllaries multiseriate, with brownish margins and arista, floccose, later glabrescent; outer phyllaries 1.5-2 x 1 mm, ovate to oblong-ovate, acute, the middle 4-5 x 1-1.5 mm, lanceolate, the inner 5.5-7 mm, narrowly lanceolate, acuminate; bisexual florets 7-8 mm; achenes 1.5-1.8 mm; pappus 7-9 mm, scabrid at the apex.

M, De, S; sandy and stony ground. Egypt, Palestine, Saudi Arabia.

NOTE: The type of *Phagnalon barbeyanum* was collected in Wadi Hamata, Gebel Ataqa, Eastern Desert, Egypt, 12 April 1880, Schweinfurth 303 (lectotype K!, isolectotypes C, W).

4. ***Phagnalon schweinfurthii*** Sch.Bip. ex Schweinf., Verh. K. K. Zool. Bot. Ges. Wien 18: 685 (1868).

White-woolly perennial 15-40 cm; stems much-branched from the woody base; leaves 2.5-6 x 0.25-0.6 cm, narrowly oblanceolate, the margins not sinuate, not or slightly revolute, the base clasping, the apex acute, densely white-woolly beneath, glabrescent on the upper surface; peduncle 4-7 cm; capitula solitary; involucre 1.5-1.8 cm diam.; phyllaries multiseriate, floccose; outer phyllaries 1.5-2.5 x 1-1.2 mm, lanceolate, with narrow scarious margins and 2 purple streaks from the acuminate apex to base; middle phyllaries 4-6 x 1 mm, with 2 purplish streaks, apex acute; inner phyllaries 6.5-8 x 0.75 mm, linear-lanceolate, scarious, the apex acuminate, purplish; bisexual florets c. 40, c. 8 mm; corollas yellow; corolla-tube sparsely hairy; ray limb 1 mm diam., the lobes recurved; stamens exserted; achenes c. 1 mm; pappus 5-7 mm, of scabridulous bristles.

GE; rocky ground 1,000-1,500 m. Egypt, Sudan, Saudi Arabia.

NOTE: Syntypes of *Phagnalon schweinfurthii* were collected in the Nubian Desert, "Sortuba-Gebirge an der Nubischen Küste, 22° n. B., am Castle Hill", 6 March 1865 (Syntypes K!, P); Gebel Schellal, 6 March 1865, Schweinfurth 365, (Syntype P, isosyntypes BM, K!, W). These two localities are just on the Egyptian-Sudanese boundary (22° N) in the Gebel Elba region. We have also examined several specimens from Saudi Arabia which match the above syntypes except for the leaves which are smaller and narrower at high altitudes. These, according to Qaiser & Lack (1985) and Fayed (1991), are classified as var. *androssovii* (B. Fedtsch.) Qaiser & Lack, while the Egyptian-Sudanese specimens of Schweinfurth are classified by them as var. *schweinfurthii*. They separated the above two varieties by the leaf characters; Qaiser & Lack, *l.c.*, note: "the leaves in *Ph. schweinfurthii* are longer (20-60 x 3-5 mm) and usually with flat margins, while in the other taxon [they mean var. *androssovii*] the leaves are smaller 6-15(-35) x 1-3(-4) mm, with revolute margins. Due to the presence of

this small difference we regard these two entities as different varieties of one species". They also admitted that there are no differences between the two varieties as regards the shape, size and pubescence of the phyllaries, number of bisexual florets per capitulum and their pubescence. In this treatment therefore, the name *Phagnalon schweinfurthii* is applied to the Egyptian material, with no mention of any varietal names, and the range of our taxon will be restricted to Egypt, Sudan (Gebel Elba frontier zone) and Saudi Arabia.

5. **Phagnalon rupestre** (L.) DC., Prodr. 5: 396 (1836).

Syn. *Conyza rupestris* L., Mant. 113 (1767).

Appressed-woolly perennial 15-40 cm, woody at the base; stems numerous, branched, white-woolly, erect or ascending; leaves 1-2.5 x 0.1-0.25 cm, oblong-oblongate, green and thinly tomentose on the upper surface, white-woolly beneath, the margins revolute and sinuate, the base clasping, the apex subacute; capitula solitary, on peduncles 3-7 cm; involucre 1-1.2 cm; phyllaries multiseriate, glabrous, glossy, the outer 1-3 x 1-1.5 mm, ovate to oblong-ovate, the apex rounded and brownish; inner phyllaries 4-6 x 0.75-1 mm, linear, scarious, obtuse; florets 6-7 mm; corollas yellow; achenes c. 1 x 0.2 mm; pappus 9 mm, of brittle bristles.

M, D, S; stony ground. Mediterranean region, Sinai, Arabia, Iraq, Iran.

35. **Homognaphalium** Kirp.

Syn. *Homognaphalium* Fayed & Zareh non Kirp., nom. illegit.

Literature: Fayed, A. & Zareh, M. 1989. Systematic revision of Compositae in Egypt. 4. Tribe Inuleae: *Gnaphalium* and related genera. Willdenowia 18: 445-453.

Prostrate annuals; leaves sessile, tomentose; capitula disciform, in dense terminal clusters surrounded by rosette of leaves; phyllaries hyaline, acute to acuminate; bisexual florets funnel-shaped; outer florets female, outnumbering the central; corollas of all florets yellow; achenes with short, clavate, myxogenic twin hairs; achene epidermis smooth; pappus of slender barbellate bristles; bristle apical cells subclavate. 2 species, North Africa, Sudan, southwest Asia, India.

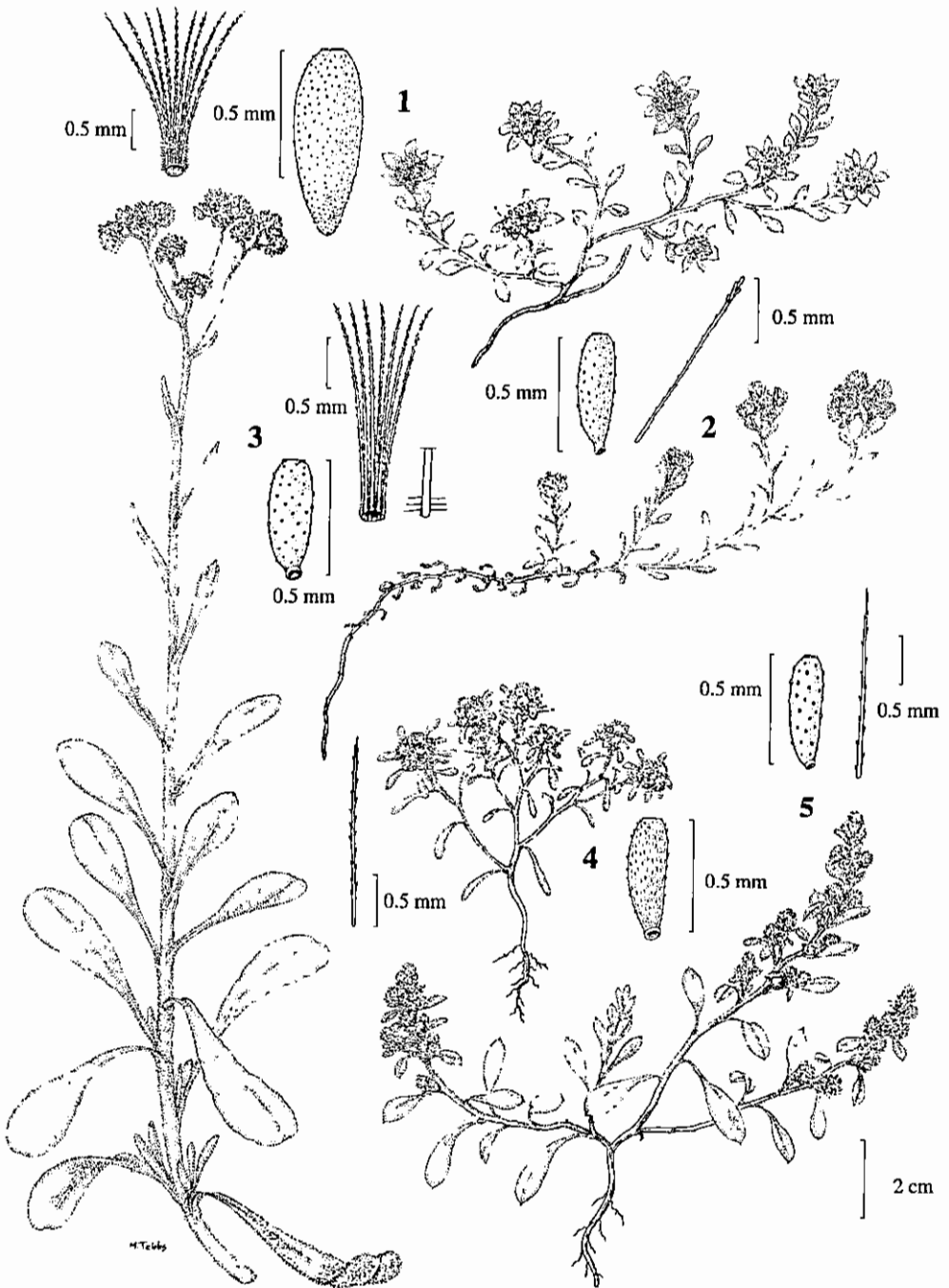
1. Capitula subtended by a series of involucrate leaves; phyllaries acute to acuminate; bisexual florets funnel-shaped; pappus-setae barbellate near the base 1. **H. pulvinatum**  
+ Capitula not subtended by involucrate leaves; phyllaries obtuse to subacute; bisexual florets tubular; pappus-setae naked at the base 2. **H. crispatum**

1. **Homognaphalium pulvinatum** (Delile) Fayed & Zareh, Willdenowia 18: 451 (1989).  
Syn. *Gnaphalium pulvinatum* Delile, Descr. Egypte, Hist. Nat. 266, t. 44 (1814).

Prostrate greyish-woolly annual; stems 5-15 cm, many from the base, much-branched, slender; leaves 0.5-1.5 x 0.2-0.4 cm, spatulate, sessile or short-petiolate, the apex mucronate; capitula 3 mm, campanulate, disciform, densely congested in terminal clusters c. 1 cm diam., and surrounded by a series of involucrate leaves; phyllaries 2-3-seriate, scarious; stereome divided; outer phyllaries linear-lanceolate, acute, the inner linear, exceeding the florets, white or purplish at the acuminate apex; bisexual florets 3-6, infundibular; female florets 1.5 mm, numerous; achenes c. 0.8 x 0.3 mm, scabridulous; pappus-setae 2 mm, barbellate near the base.

N, O, De, S; canal banks, moist ground. Egypt, Sudan, Arabia, Iran, Pakistan, India.

NOTE: The type of *Gnaphalium pulvinatum* was collected in Egypt, "sur les terres basses qui ont été inondées" in the low lands which were inundated, Delile s.n. (MPU).



**Plate 50. COMPOSITAE:** *Homognaphalium pulvinatum* 1, habit; achene and pappus (left). *Homognaphalium crispatum* 2, habit; achene and pappus bristle (up). *Pseudognaphalium luteoalbum* 3, flowering and fruiting branch; achene, pappus and basal part of a pappus bristle with long patent cilia (up right). *Gnaphalium uliginosum* 4, habit; achene (right); pappus bristle (left). *Gnaphalium polycaulon* 5, habit; achene and pappus bristle (up right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbis.

2. **Homognaphalium crispatum** (Delile) Kirp., Trudy Bot. Inst. Akad. Nauk SSSR, ser. 1, Fl. Sist. Vyss. Rast. 9: 32 (1950).  
Syn. *Gnaphalium crispatum* Delile, Descr. Egypte, Hist. Nat. 267, t. 44, f. 3 (1814).

Woolly-canescens annual 3-8 cm; stems slender, prostrate, branched; leaves 5-8 x 1-2 mm, narrowly spatulate, attenuate to a short petiole, the apex acute; capitula 2-2.5 mm, campanulate, congested in terminal clusters, surrounded by involucre leaves; phyllaries 2-3-seriate, densely woolly, the outer c. 1.5 mm, elliptic-linear, white, scarious, the inner 2-2.5 mm, linear, acute to acuminate; stereome undivided; achenes c. 0.5 x 0.2 mm; pappus of deciduous setae, setae of bisexual florets with clavate apical cells, naked at base.

N; moist ground, Nile banks, irrigation canals. North Africa.

NOTE: The type of *Gnaphalium crispatum* was collected "dans les îles du Nil", in the Nile islands, Egypt, Delile s.n. (MPU).

36. **Pseudognaphalium** Kirp.  
Syn. *Hypelichrysum* Kirp.

Literature: see reference under *Homognaphalium* Kirp., p. 205.

Perennial, biennial or annual herbs; leaves sessile, sometimes clasping and decurrent; capitula disciform, in small, loose, terminal, flat-topped corymbs; phyllaries yellowish, white or brownish; stereome strongly divided; corollas yellow; outer florets female, outnumbering the central; central florets bisexual, tubular; achenes glabrous or sparsely hairy, with short clavate myxogenic twin hairs epidermal cells generally papillose; stereome divided; pappus setae connate at the base, with long patent cilia, apical cells subclavate. About 80 species, mainly South and Central America, 1 species cosmopolitan.

1. **Pseudognaphalium luteoalbum** (L.) Hilliard & B. L. Burtt, Bot. J. Linn. Soc. 82: 206 (1981).  
Syn. *Gnaphalium luteoalbum* L., Sp. Pl., ed. 1, 851 (1753).

White-woolly annual 15-50 cm; stems erect or ascending, branched; leaves 2-7 x 0.3-1.5 cm; lower spatulate, slightly sinuate, woolly on both surfaces, the apex rounded; cauline smaller, oblong-linear, sessile, clasping; peduncle 0.5-1.5 cm; capitula 3-4 mm, campanulate, sessile or subsessile, numerous, congested into leafless cymose glomerules; phyllaries 2-3-seriate, 2-3 x 0.5-1 mm, scarious, glabrous, straw-coloured, glossy, spreading after achene dispersal; outer phyllaries 3 x 1 mm, ovate-lanceolate, the apex acute; inner phyllaries linear, 2 x 0.5 mm; receptacle 1.5 mm diam., naked, flat, tuberculate; bisexual florets 5-9, tubular; female florets numerous; stereome strongly divided; achenes 0.5 x 0.2 mm, oblong, minutely papillose; pappus c. 2 mm, of setae connate at the base, with long patent cilia.

N, O, M, De, S; weed of canal banks, moist ground near springs. Cosmopolitan.

37. **Gnaphalium** L.  
Syns. *Amphidoxa* DC., *Demidium* DC., *Filaginella* Opiz,  
*Omalotheca* Cass., *Synhaeta* Kirp.

Literature: see reference under *Homognaphalium* Kirp., p. 205.

Annuals or perennials; leaves sessile, tomentose; capitula disciform, few together, sometimes surrounded by a whorl of leaves; phyllaries brownish; stereome undivided or

with thin streaks; outer florets female, purple, outnumbering the disc florets; corollas purple (at least at apex or base); achenes sparsely hairy, with short clavate, not myxogenic; stereome undivided or with thin streaks; pappus setae free at the base, barbellate. About 50 species, cosmopolitan.

1. Capitula in leafy spike-like racemes  
+ Capitula not racemose

2. **G. polycaulon**  
1. **G. uliginosum**

1. **Gnaphalium uliginosum** L., Sp. Pl., ed. 1, 856 (1753).

Syn. *Filaginella uliginosa* (L.) Opiz, Abh. Böhm. Ges. Wiss., ser. 5, 8  
(Sitzungsber. Sect.): 52 (1854).

Greyish-tomentose annual 5-15 cm; stems branched from the base, densely leafy; leaves 1-3 x 0.2-0.6 cm, narrowly oblanceolate, subacute, greyish-green and glabrescent on the upper surface, white-tomentose beneath; capitula in congested terminal clusters of 3-6, surrounded by a whorl of leaves; involucre 2-3 mm diam.; phyllaries 1.5-2 x 0.5-0.75 mm; scarious, yellowish-brown, the outer lanceolate, the inner linear; outer female florets 80-120; central florets bisexual,  $\pm$  8; corollas c. 1.5 mm, purplish; achenes c. 0.5 x 0.15 mm, minutely puberulent with short hairs; pappus 1.5 mm, of barbellate setae, deciduous.

N (Luxor, Aswan); moist ground. Europe, Egypt, Lebanon, Turkey.

2. **Gnaphalium polycaulon** Pers., Syn. Pl. 2: 421 (1807).

Syns. *Gnaphalium multicaule* Willd., Sp. Pl., ed. 4, 3: 1888 (1803), non Lam.  
(1789).

*Gnaphalium niliacum* Spreng., Syst. Veg. 3: 480 (1826).

*Gnaphalium spathulatum* Delile, Descr. Egypte, Hist. Nat. 266, t. 44, f. 2  
(1814), non Lam. (1788).

*Gnaphalium indicum* sensu auct., non L. (1753).

White-woolly annual 10-20 cm; stems branched at the base, ascending or decumbent; leaves 1-3.2 x 0.3-1.2 cm, spatulate, the apex rounded, mucronate, the base attenuate to a petiole, white-woolly beneath, glabrescent on the upper surface; capitula 3 mm, campanulate, sessile, in terminal and subterminal sessile clusters, forming leafy spike-like racemes; phyllaries 2-3-seriate, the outer 1-2 x 1 mm, ovate-lanceolate, woolly, with scarious margin and green midrib, the inner 2-2.5 x 0.5 mm, oblong, scarious; bisexual florets 4-6; female florets numerous; achenes c. 0.5 x 0.15 mm, papillose; pappus 2 mm, of deciduous setae; setae of bisexual florets with linear apical cells.

N, M; moist waste ground, canals and Nile banks. Egypt, tropical Africa and Asia, Australia, West Indies, Brazil.

38. **Helichrysum** Mill., nom. et orth. conserv.

Syn. *Leontonyx* Cass.

Literature: see reference under *Homognaphalium* Kirp., p. 205.

Perennials, annuals or low shrubs; leaves hairy or pilose, often with a revolute margin; capitula disciform or discoid, in terminal loose flat-topped corymbs, or solitary; phyllaries multiseriate, brown, yellow, pink or white, scarious, persistent, stereome divided; outer florets female, fewer than the bisexual central florets; corollas yellow; achenes sparsely hairy with short clavate myxogenic hairs, or with long hairs (not



myxogenic), or glabrous; epidermis smooth or often papillose; pappus of barbellate or subplumose bristles, basally with or without patent cilia; apical cells clavate or not. About 600 species, Africa (especially South Africa), Madagascar, Europe, Asia.

1. Capitula 1.5-2 mm broad at anthesis, narrowly cylindrical; phyllaries white; florets 7-9 per capitulum 3. **H. glumaceum**  
+ Capitula 0.5-1.2 cm broad at anthesis, broadly campanulate or globose; phyllaries bright yellow; florets over 20 per capitulum 2
2. Leaves 1-2.5 x 0.15-0.25 cm, narrowly linear to linear-spathulate, margins revolute 2. **H. conglobatum**  
+ Leaves 2.5-6.5 x 0.25-1.4 cm, oblong-lanceolate, margins flat 1. **H. orientale**

1. **Helichrysum orientale** (L.) Gaertn., Fruct. Sem. Pl. 2: 404 (1791).  
Syn. *Gnaphalium orientale* L., Sp. Pl., ed. 1, 853 (1753).

Greyish-woolly eglandular low shrub, 15-50 cm; stems branched, the old stems woody; branches leafy; leaves 2.5-6.5 x 0.25-1.4 cm, narrowly linear to linear-spathulate, the margins flat; capitula numerous, in terminal compound cymose inflorescences, 0.8-1.2 cm broad, subglobose at anthesis; phyllaries 10-12-seriate, closely imbricate, bright yellow, the outer woolly at the base; female florets 10-25; bisexual florets 40-90; achenes 1-1.25 x 0.4 mm, cylindrical, sparsely hairy, the hairs 3-celled; pappus of 11-19 whitish-yellow barbellate bristles, connate at the base, with acute apices.

M (Ras El-Hekma); littoral calcareous ridges. Egypt, Greece, Aegean Islands, Turkey.

NOTE: The above description is based on specimens from Greece and the Aegean Islands; we have not seen the material collected from Ras El-Hekma. This species is not listed in the account given by Fayed & Zareh (1989).

2. **Helichrysum conglobatum** (Viv.) Steud., Nomencl. Bot., ed. 2, 1: 738 (1840).  
Syns. *Gnaphalium conglobatum* Viv., Fl. Libyc. Spec. 55, t. 3, f. 5 (1824).  
*Helichrysum siculum* Boiss., Fl. Orient. 3: 229 (1875).

Greyish-green woolly perennial, 10-40 cm, with woody base; stems ascending, leafy; leaves 1-3.5 x 0.15-0.25 cm, narrowly linear to linear-spathulate, the margins revolute; capitula in compact terminal corymbose inflorescences, 2-8 x 4-9.5 mm, ovoid in bud, campanulate at anthesis; peduncle 1.5-8 mm; phyllaries 5-7-seriate, imbricate, bright yellow, glossy, the outer 1.5 x 1 mm, elliptical, obtuse, the middle longer, obovate, obtuse; inner twice as long as the outer, oblong-spathulate to oblong-linear, acute; female florets 8-18; bisexual florets 15-40; corolla-tube 3.5-4.5 mm; achenes 0.6-0.8 mm, cylindrical, with scattered 3-celled white hairs; pappus of 10-20 white barbellate bristles.

M; calcareous and sandy coastal ridges. Mediterranean region.

3. **Helichrysum glumaceum** DC., Prodr. 6: 197 (1838).  
Syn. *Achyrocline glumacea* (DC.) Oliv. & Hiern in Oliv., Fl. Trop. Afr. 3: 340 (1877).

Greenish-woolly low shrub, 20-60 cm; stems erect, leafy; leaves 3-6 x 0.2-0.4 cm, linear, the margins revolute, the apex acute, white-woolly beneath, glabrescent on the upper surface; capitula 4-5 x 1.5-2 mm at anthesis, narrowly cylindrical; phyllaries 3-4-seriate,



Plate 51. COMPOSITAE: *Helichrysum orientale* 1, habit; achene (down right). *Helichrysum conglobatum* 2 habit. *Helichrysum glumaceum* 3, habit. *Leysera leyserioides* 4, habit; capitulum (down left); ray achene (down, right); disc achene (down, further right). *Limbarda crithmoides* 5, flowering branch; leafy branchlet (down); achene (up left). *Dittrichia viscosa* 6, flowering and fruiting branch; achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

imbricate, white, the outer 0.5-0.75 x 0.5 mm, ovate, subacute, the middle longer, ovate-lanceolate, subacute, the inner 3-3.5 x 1 mm, lanceolate, subacute; florets 7-9 per capitulum; corollas yellow; achenes 0.5 mm, cylindrical; pappus 2 mm, of barbellate bristles.

GE; stony ground. Southeast Egypt, tropical East Africa, Ethiopia, Eritrea, Socotra, West tropical Africa.

### 39. *Leysera* L.

Literature: Fayed, A. 1991. Systematic revision of Compositae in Egypt. 7. Tribe *Inuleae*: *Phagnalon* and *Leysera*. Willdenowia 20: 97-102.

Annuals or low shrubs; leaves alternate, occasionally opposite, linear, sessile, mucronate, glandular-hairy; capitula solitary, radiate, terminal, on long leafless peduncles; corollas of ray florets yellow, with purple bands dorsally; tube often with robust conical trichomes; pappus of scales only; corollas of disc florets yellow, often with robust multicellular trichomes; achenes rod-like, glabrous or with scattered twin hairs; pappus of free apically plumose bristles, with an outer row of obtuse scales. 3 species, Spain, North and South Africa, southwest Asia.

1. *Leysera leyseroides* (Desf.) Maire, Bull. Soc. Hist. Nat. Afr. Nord 20: 186 (1929).

Syns. *Gnaphalium leyseroides* Desf., Fl. Atlant. 2: 267 (1799).

*Longchampia capillifolia* Willd., Ges. Naturf. Freunde Berlin Mag. 5: 160 (1811).

*Leysera capillifolia* (Willd.) DC., Prodr. 6: 275 (1838).

*Asteropterus leyseroides* (Desf.) Rothm., Feddes Repert. 53: 4 (1944).

Viscid, glandular-hairy annual 5-20 cm; stems erect, with slender spreading branches; leaves 1-3.5 x 0.05-0.1 cm, narrowly linear, sessile, subacute; capitula solitary, terminal, on leafless capillary glabrous peduncles 3-6 cm; involucre 0.8-2 cm, ovoid; phyllaries 4-5-seriate, imbricate, scarious, glabrous, the outer 1-1.5 x 1 mm, ovoid, keeled, acute; middle and inner progressively longer, lanceolate to oblong-lanceolate, obtuse; achenes 4 x 0.4 mm, narrowly cylindrical; pappus c. 3 mm.

De, GE, S; sandy and stony desert wadis. Spain, North Africa, Sinai, Palestine, Syria, Arabia, Iraq, eastwards to Pakistan.

### 40. *Limbarda* Adans.

Glabrous low shrub; leaves fleshy, subterete, entire or often apically 3-lobed; heads solitary or in lax corymbs, radiate; receptacle honeycombed; phyllaries multiseriate, narrow; ray florets female, yellow; disc florets bisexual, yellow; anthers ecalcarate, with branched tails; achenes ellipsoid, with 5 secretory ducts; pappus of barbellate multiseriate bristles. 1 species, Macaronesian Islands, Mediterranean region, western Europe, northwards to Scotland, mostly coastal.

1. *Limbarda crithmoides* (L.) Dumort., Fl. Belg. 68 (1827).

Syn. *Inula crithmoides* L., Sp. Pl., ed. 1, 883 (1753).

Glabrous low shrub 0.4-0.8(-1.2) m; stems erect or ascending; leaves 2-4.5 x 0.2-0.6 cm, linear to linear-oblongate, fleshy, glabrous, green, entire or 3-dentate at the apex; capitula solitary or few together in a lax corymb; peduncle 2-6 cm, thickening after anthesis; involucre 1-1.5 cm diam., subglobose; phyllaries 2-3-seriate, glabrous, the outer 3-4 x 0.5 mm, the inner 0.5-1 x 0.05-0.1 cm, linear, acuminate; ray florets c. 20; anthers ecalcarate, with branched tails; achenes 1.5-2 x 0.3-0.4 mm, ellipsoid, with 5 secretory ducts, appressed-pubescent; pappus c. 5 mm, of 30-50 bristles, free at the base, barbellate.

N, O, M; saline soils, edges of drainage canals. Distribution as for the genus.

#### 41. *Dittrichia* Greuter

Annuals or perennials; leaves lanceolate to linear, sessile, dentate, glandular, viscid, hairy; capitula small, radiate, many together in dense terminal racemes or panicles; receptacle honeycombed; phyllaries glandular; ray florets female; disc florets bisexual; corollas yellow; anthers ecalcarate, with branched tails; achenes ellipsoid, hairy, apically constricted, glandular; pappus of barbellate bristles, connate at the base and concrescent into a cupule. 2 species, Mediterranean region, introduced and naturalized in North and South America and Australia.

1. Perennial with woody base; leaves to 1.5(-2) cm broad, oblong-linear;  
ray florets much exceeding the involucre 1. *D. viscosa*  
+ Annual; leaves to 8 mm broad, linear to narrowly lanceolate;  
ray florets hardly exceeding the involucre 2. *D. graveolens*

1. *Dittrichia viscosa* (L.) Greuter, Exsicc. Genav. 4: 71 (1973).

Syns. *Erigeron viscosum* L., Sp. Pl., ed. 1, 863 (1753).

*Inula viscosa* (L.) Aiton, Hort. Kew., ed. 1, 3: 223 (1789).

Glandular-hairy, viscid, strong-smelling perennial, with woody base, 30-80 cm; stems branched from the base; leaves 1.5-6 x 0.5-1.5(-2) cm, oblong-linear to elliptic, sessile, half clasping, serrate, acute, densely glandular-hairy; capitula in long terminal racemes or panicles, radiate; peduncle 0.5-2 cm; involucre campanulate; phyllaries 5-6-seriate, glandular, the outer 2 x 1 mm, ovate, obtuse; middle and inner progressively longer, to 9 x 1 mm, the margins scarious, obtuse to acute; ray florets c. 10, much exceeding the involucre; ray limb 0.8-1 cm; disc florets 8-10; corollas 5-7 mm; achenes 1.5 x 0.5 mm, ellipsoid, constricted at the apex into a short neck, sparsely hairy, glandular; pappus bristles c. 20, connate at the base and forming a brownish cupule.

N, M, S; waste ground, hillsides, edges of cultivation, drainage and canal banks. Mediterranean region, Sinai.

2. *Dittrichia graveolens* (L.) Greuter, Exsicc. Genav. 4: 71 (1973).

Syns. *Erigeron graveolens* L., Cent. Pl. 1: 28 (1755).

*Inula graveolens* (L.) Desf., Fl. Atl. 2: 275 (1799).

Glandular-hairy, viscid, aromatic annual, 40-80 cm, with long sparse hairs; stems much-branched, sulcate; leaves 1.2-5.5 x 0.2-0.8 cm, linear to narrowly lanceolate, entire or remotely-denticulate, subacute, sessile; peduncle to 1.5 cm; capitula 0.8-1.2 cm diam., numerous, in leafy panicles, radiate; phyllaries 3-4-seriate, 3-7 x 0.8-1 mm, narrowly

lanceolate, the midrib green and glandular-hairy, the margins scarious, the apex acuminate; ray florets *c.* 8, hardly exceeding the involucre; ray limb *c.* 3 x 0.8 mm; disc florets 3.5-4 mm, narrowly tubular; achenes 2 x 0.8 mm, fusiform, thinly pilose, not angled or ribbed, constricted at the apex into a short neck; pappus 3-4 mm, of 20-25 subequal barbellate hairs.

M; weed of cultivation, waste ground. Mediterranean region, eastwards to Afghanistan and northwest India.

NOTE: This is the first record of *Dittrichia graveolens* in Egypt, collected near Burg El-Arab, *c.* 50 km west of Alexandria, 29 September 2001, Boulos 19496 & El-Gharib (K; Herb. Boulos, Cairo). The plant appears to be completely naturalized and quite abundant in the newly reclaimed land in and around Brug El-Arab, in orchards, palm groves and fields. It is most likely to be growing elsewhere in the country.

#### 42. *Pegolettia* Cass.

Literature: Anderberg, A. A. 1986. The genus *Pegolettia* (Compositae-Inuleae). *Cladistics* 2: 158-186.

Annuals, perennials or low shrubs; leaves dentate or entire, rarely lobed, glandular, pubescent; capitula discoid; receptacle honeycombed; corollas yellow or purple-tinged; lobes with acute hairs apically; anthers with branched tails; achenes cylindrical, with sclerenchymatous ribs, the epidermis with several small crystals; pappus heteromorphous, of barbellate or plumose bristles, with an outer row of small, narrow, entire bristle-like scales. 9 species, Africa, Madagascar, Arabia to Java.

1. *Pegolettia senegalensis* Cass., *Dict. Sci. Nat.* 38: 232 (1825).  
*Syn. Kuhnia arabica* DC., *Prodr.* 7: 267 (1838).

Glandular-pubescent aromatic annual, 20-50 cm; stems sulcate, much-branched; leaves 1-3 x 0.2-0.5 cm, oblong-linear to linear, entire or obscurely dentate, sessile, the apex mucronate, glandular-hairy on both surfaces; capitula numerous, terminal; peduncle 1-3.5 cm, bracteate; involucre 5-7 mm, campanulate; phyllaries 2-seriate, pubescent, the outer 5-6 x 0.5 mm, linear, acuminate; inner 6-7 x 1 mm, lanceolate, scarious-margined, the midrib green, pubescent, acuminate; florets all tubular; corollas yellow; achenes 4-5 x 0.6-1 mm, closely ribbed, thinly pubescent; pappus 6-7 mm, of outer bristle-like short scales and inner plumose bristles.

R, De, GE; sandy soils. Egypt, Arabia, Mauritania and Senegal, eastwards to central Sudan, Angola, dry regions of tropical South Africa.

#### 43. *Iphia* Cass., nom. conserv.

*Syns. Grantia* Boiss., *Hirschia* Baker, *Perralderiopsis* Rauschert

Literature: Anderberg, A. A. 1985. The genus *Iphia* (Compositae-Inuleae). *Nord. J. Bot.* 5: 169-194.

Shrubs or woody perennials; leaves sessile, entire, lobed or pinnatisect, often fleshy or xeromorphic, hairy to glabrous; capitula radiate or discoid, solitary or few together; receptacle honeycombed; phyllaries chartaceous, the outer sometimes leaf-like; ray florets sterile; disc florets bisexual; corollas yellow; corolla epidermis with sinuous cell walls, containing long needle-like crystals; anthers with short tails; achenes ellipsoid,

conspicuously ribbed; pappus of unequal spreading scabrous or barbellate multiseriate bristles, or of unequal 1-seriate bristles with an outer row of small scales. 11 species, North Africa, Sinai, Palestine, Arabia, Iraq, Iran, Pakistan, Sudan, Ethiopia, Somalia.

1. Plant glabrous or with sparse  $\pm$  sessile glands; cauline leaves with lateral spines along the lower half 1. **I. mucronata**  
+ Plant glandular-hairy, viscid; cauline leaves with lateral spines only at the base 2. **I. scabra**

1. **Iphiona mucronata** (Forssk.) Asch. & Schweinf., Mém. Inst. Egypt. 2: 86 (1887).  
Syns. *Chrysocoma mucronata* Forssk., Fl. Aegypt.-Arab. 147 (1775).  
*Conyza pungens* Lam., Encycl. 3: 86 (1789).  
*Stahelina spinosa* Vahl, Symb. Bot. 69 (1790), nom. illeg.  
*Chrysocoma spinosa* (Vahl) Delile, Descr. Egypte, Hist. Nat. 128 (1814).

Low glabrous shrub 25-60 cm; stems intricate, sulcate, the young shoots with  $\pm$  sessile glands; leaves 1-4 x 0.7 cm, subulate, sessile, rigid, spinescent, entire or with 2-5 short spinescent lobes along the lower half; capitula solitary, in lax corymbs; peduncle 2-5 cm, bracteate; involucre 7-9 mm, cylindrical to obconical; phyllaries 4-seriate, glabrous, the outer 2 x 1 mm, broadly ovate, keeled, mucronate; middle and inner 4-9 x 1.5 mm, oblong-obovate, the margins scarious, the apex obtuse, mucronate; florets 5-7 mm; achenes c. 2.5 x 0.75 mm, ribbed, hirsute; pappus 5-6 mm, of numerous unequal multiseriate barbellate bristles.

De, S; stony desert wadis. Egypt, Palestine, Arabia.

NOTE: The type of *Chrysocoma mucronata* was collected near Cairo, Egypt, "Environs du Caire", Lippi *s.n.* (holotype P-JU).

2. **Iphiona scabra** DC. in Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 263 (1834).

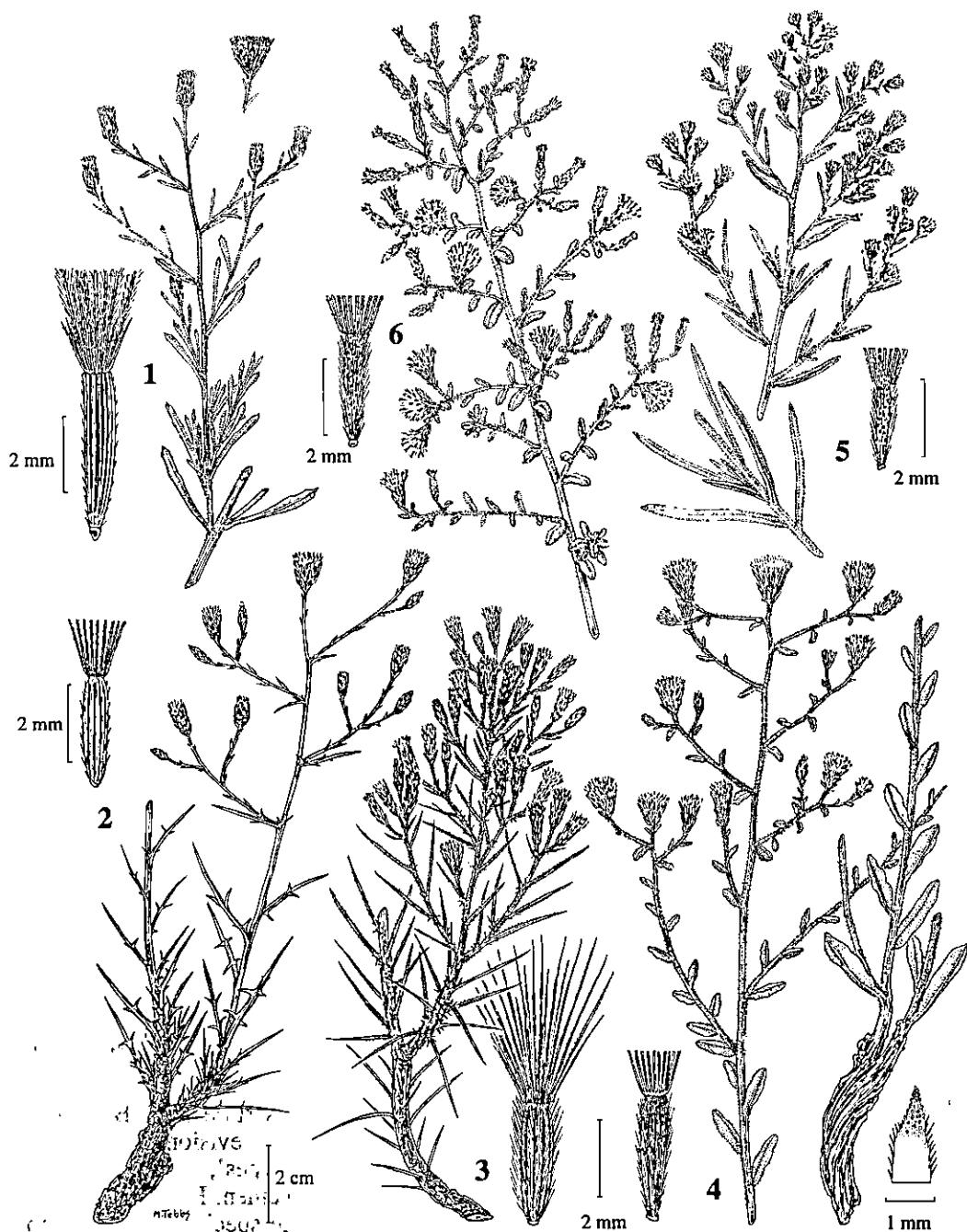
Glandular-hairy viscid low shrub, 25-60 cm; stems densely branched, the young branches sulcate; leaves 1.2-4.5 x 0.1-0.6 cm, subulate, sessile, rigid, spinescent, flat to canaliculate, acuminate, with 1-3 short spinescent lobes at the base; capitula numerous, in lax corymbs; peduncle 0.3-1 cm; involucre 8-9 mm, obconical; phyllaries 3-4-seriate; the outer 2 x 1 mm, ovate, mucronate, the middle and inner 4-9 x 1 mm, scarious except for the greenish midrib, cuspidate; florets 7-9 mm; achenes 2.5-3 x 1-1.5 mm, ellipsoid, hirsute; pappus 6-7 mm, of c. 70 multiseriate barbellate bristles.

De, R, GE, S; stony and sandy desert wadis. Egypt, Palestine, Saudi Arabia, Oman, Yemen, Sudan, Ethiopia.

NOTE: The type of *Iphiona scabra* was collected in Sinai, "Le désert de Tor", Bové 104 (holotype G-DC; isotypes BR, FI-W, G, K, L, P). Anderberg, in his revision of the genus *Iphiona* (1985), recognized three different 'morphological types' represented by populations of *Iphiona scabra* from Sinai, Oman and southern Yemen. However, he did not recognize them as distinct taxa. The above description of the species refers only to the Egyptian material.

#### 44. **Chiliadenus** Cass.

Literature: Brullo, S. 1979. Taxonomic and nomenclatural notes on the genera *Jasonia* Cass. and *Chiliadenus* Cass. (Compositae). *Webbia* 34: 289-308.



**Plate 52. COMPOSITAE:** *Pegolettia senegalensis* 1, flowering branch; fruiting capitulum (up); achene (down left). *Iphiona mucronata* 2, habit; achene (up left). *Iphiona scabra* 3, flowering and fruiting branch; achene (down right). *Chiliadenus montanus* 4, flowering branch and basal part; phyllary tip (down right); achene (down left). *Chiliadenus candicans* 5, flowering and fruiting branch; leafy branchlet (down); achene (down right). *Chiliadenus iphionoides* 6, flowering and fruiting branch; achene (left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

Perennials or low shrubs; leaves sessile, ovate to lanceolate, glandular-hairy; capitula homogamous, discoid, solitary or few, or in dense racemose clusters; receptacle honeycombed; involucre campanulate; all florets bisexual; corollas yellow; anthers with very short tails; achenes ellipsoid, hairy, apically constricted, glandular; pappus of barbellate bristles, with an outer row of narrow scales. 9 species, Mediterranean region, southern Europe, North Africa, southwest Asia.

1. Leaves on vegetative shoots 2.5-4.5 x 0.2-0.3 cm, linear 2. **C. candicans**  
+ Leaves on vegetative shoots 0.4-2 x 0.4-0.6 cm, oblong or oblong-elliptic 2

2. Leaves 4-8 x 2-4 mm, oblong, the margins revolute;  
involucre 7-8 mm 3. **C. iphionoides**

+ Leaves 1-2 x 0.3-0.7 cm, oblong-elliptic or oblanceolate,  
the margins undulate; involucre 1-1.2 cm 1. **C. montanus**

1. **Chiliadenus montanus** (Vahl) Brullo, *Webbia* 34: 301 (1979).

Syns. *Chrysocoma montana* Vahl, *Symb. Bot.* 1: 70 (1790).

*Varthemia montana* (Vahl) Boiss., *Fl. Orient.* 3: 212 (1875).

*Jasonia montana* (Vahl) Botsch., *Novosti Sis. Vyss. Rast.* 1964: 365 (1964).

Yellowish-green, appressed-pubescent glandular low shrub, 20-60 cm; stems much branched; leaves 1-2 x 0.3-0.7 cm, oblong-elliptic or oblanceolate, sessile, glandular-hairy on both surfaces, the margins undulate, the apex acute or obtuse; capitula numerous, solitary, in broad lax paniculate inflorescences to 40 cm; peduncle 1-2.5 cm, bracteate; involucre 1-1.2 cm, campanulate; phyllaries 3-4-seriate, loosely imbricate, glandular-hairy, yellow, the outer and middle greenish at the obtuse apex; inner scarious and longer; achenes 3-3.5 x 0.5-0.6 mm, ellipsoid, densely hairy; pappus 4-5 mm, of reddish-brown bristles.

De, S; rocky wadis and hillsides. Egypt, Palestine, Arabia.

2. **Chiliadenus candicans** (Delile) Brullo, *Webbia* 34: 301 (1979).

Syns. *Chrysocoma candicans* Delile, *Descr. Egypte, Hist. Nat.* 358, t. 46 (1814).

*Linosyris candicans* (Delile) DC., *Prodr.* 5: 352 (1836).

*Varthemia candicans* (Delile) Boiss., *Fl. Orient.* 3: 212 (1875).

*Jasonia candicans* (Delile) Botsch., *Novosti Sis. Vyss. Rast.* 1964: 364 (1964).

Greyish velvety-pubescent, strongly aromatic low shrub, 20-50 cm; stems much-branched, leafy; leaves on vegetative shoots 2.5-4.5 x 0.2-0.3 cm, linear, sessile, the margins revolute, the apex acute, densely pubescent-villose on both surfaces; leaves on flowering shoots shorter; capitula numerous, in leafy paniculate inflorescences to 20 cm; involucre 7-8 mm, campanulate; phyllaries 4-5-seriate, loosely imbricate, glandular-pubescent, the outer and middle greenish at the obtuse apex; inner scarious and longer; achenes c. 2 x 0.4 mm, hairy; pappus 4.5-5 mm, of reddish bristles.

M, D; sandy soil and rocky coastal ridges. Libya, Egypt, Arabia.

NOTE: The type of *Chrysocoma candicans* was collected in Egypt.



subsp. **monanthos**

- Syns. *Santolina terrestris* Forssk., Fl. Aegypt.-Arab. 147 (1775).  
*Anacyclus alexandrinus* Willd., Sp. Pl., ed. 4, 3: 2173 (1803).  
*Anthemis arabica* Viv., Fl. Libyc. Spec. 56 (1824), non L.  
*Hiorthia alexandrina* (Willd.) Less., Syn. Gen. Comp. 258 (1832).  
*Cyrtolepis alexandrina* (Willd.) DC., Prodr. 6: 17 (1838).

Peduncles prostrate, emerging from the axils of the rosette leaves or from the axils of paleae of syncephalous capitula, frequently swollen and coalescing into groups of 2 or 3; central capitula present, occasionally 2-4 coalescing into a syncephalum or forming a congested inflorescence.

M, Dw; cultivated and waste ground, sandy desert plains. Tunisia, Libya, Egypt.

NOTE: The type of *Santolina terrestris* was collected by Forsskål in Alexandria, Egypt, "in vicinia columna Pompeyi" (C, holotype; photo K!). The other subspecies, subsp. *cyrtolepidioides* (Pomel) Humphries, is known from eastern Morocco, Tunisia and northwestern Libya.

62. **Achillea** L.

Perennial herbs; leaves alternate, pinnatisect, lobed, rarely entire; capitula corymbose, few together or solitary, radiate, rarely discoid; receptacle flat, convex, conical, obconical or rarely much elongated, paleate; paleae sometimes with a central resin canal; ray florets female, fertile, the limb short and wide, white or yellow; tube  $\pm$  flattened; corolla of disc florets 5-lobed, flattened, basally slightly saccate around the achene; achenes flattened, with 2 lateral ribs; pappus absent. 115 species, Europe, North Africa, temperate Asia, but especially southeast Europe and southwest Asia, some naturalized in North America.

1. Low shrub, old stems woody; leaves shallowly dentate 1. **A. fragrantissima**  
+ Herbaceous perennial; leaves pinnatisect into minute imbricate 2. **A. santolina**  
segments

1. **Achillea fragrantissima** (Forssk.) Sch.Bip., Flora (Regensburg) 38: 13 (1855).  
Syn. *Santolina fragrantissima* Forssk., Fl. Aegypt.-Arab. 147 (1775).

White-woolly, strongly aromatic low shrub, 40-80 cm; old stems woody, much-branched from the base; flowering branches numerous, herbaceous, terete, rigid, densely woolly; leaves 0.2-1 x 0.15-0.3 cm, sessile, ovate, oblong or oblong-lanceolate, the margins slightly undulate, shallowly dentate and short-mucronate, the apex rounded, the midrib conspicuous on the upper surface; peduncle 0.5-4.5 mm; capitula 4.5-7 x 2.5-4 mm, in lax corymbs, discoid; phyllaries 1.5-4.5 x 1-1.2 mm, 3-4-seriate, woolly, the outer shorter, ovate, the apex obtuse, the midrib conspicuously thickened at the base; inner phyllaries oblong-ovate, the margins narrowly scarious, the apex obtuse; receptacle obconical; paleae 3-4 x 0.8-1.2 mm, lanceolate to linear-lanceolate, acute to acuminate; corollas of florets c. 3 mm,  $\pm$  cylindrical, 5-lobed, slightly saccate at the base, yellow; achenes c. 2 x 0.75 mm, narrowly obpyramidal, with 2 lateral ribs, glabrous, epappose.

O (Kharga), M, D, R, S; desert wadis and sandy plains. Libya (Cyrenaica), Egypt, Palestine, Syria, Arabia, Iraq.

NOTE: The type of *Santolina fragrantissima* was collected on Mt Horeb, Sinai, in 1762, Forsskål 1686, (C, holotype, photo K!).

2. ***Achillea santolina*** L., Sp. Pl., ed. 1, 896 (1753).

Greyish-woolly perennial herb, 10-30 cm; stems branched, erect or ascending; leaves 1-3 x 0.1-0.25 cm, linear, pinnatisect into minute, often imbricate lobes c. 0.5 x 0.5 mm; lobes divided into obovate spinulose-denticulate lobules; peduncle 1-5 mm; capitula 4-5 x 3-4 mm, in compound corymbs, radiate; phyllaries 1.4-3.2 x 0.8-1 mm, similar to those of *Achillea fragrantissima*; receptacle obconical; paleae 2.5-3 x 0.5 mm, narrowly lanceolate, long-acuminate; ray limb c. 1 x 1.5 mm, broader than long, 3-lobed, yellow; disc florets c. 2.5 mm, ± cylindrical, 5-lobed, slightly saccate at the base; achenes c. 1.5 x 0.5 mm, oblong-ovate, compressed, with 2 lateral ribs, glabrous, brownish, epappose.

O, M, D, S; calcareous and sandy soils, edges of cultivation. North Africa, Sinai, East Mediterranean region, eastwards to Afghanistan and Pakistan.

63. ***Otanthus*** Hoffmanns. & Link

Perennial with woody base, densely covered with a greyish-white indumentum; leaves alternate; capitula corymbose, discoid; receptacle convex, paleate; paleae with a central resin canal; corolla 5-lobed, basally copiously swollen and spongy, almost enclosing the achene, especially laterally; achene with 4-5 inconspicuous ribs, thin-walled, glandular. 1 species, mainly along seashores, western Europe northwards to southeast Ireland, Mediterranean region, southwest Asia to Caucasus.

1. ***Otanthus maritimus*** (L.) Hoffmanns. & Link, Fl. Port. 2: 365 (1834).

Syns. *Filago maritima* L., Sp. Pl., ed. 1, 927 (1753).

*Athanasia maritima* (L.) L., Sp. Pl., ed. 2, 1182 (1763).

*Diotis maritima* (L.) Desf., Tab. École Bot. 99 (1804).

Densely greyish white-tomentose perennial, woody at the base, 15-30 cm; stems many, branched, terete, leafy; leaves 0.5-2 x 0.3-0.5 cm, oblong to oblong-elliptic, entire or obscurely crenulate, sessile, subacute to obtuse; peduncle 0.2-1.5 cm; capitula 6-8 mm diam., subglobose, in terminal corymbs; phyllaries 2-3-seriate, 3-4 x 1.5-2 mm, ovate-oblong, concave, obtuse, tomentose; receptacle convex; paleae 4.5-5 x 1.5-2 mm, oblong-lanceolate, subacute and hairy at the apex, with a central resin canal and broad scarious margins; corolla-tube 3-3.5 x 0.8-1 mm, sparsely glandular, compressed and narrowly winged towards the base, 5-lobed; corolla-lobes 0.5 mm, deltoid-ovate; achenes 1.8-2 x 1-1.2 mm, compressed, obovate, tapering at the base, yellow-glandular, the apex included in the accrescent spongy base of the corolla; pappus absent.

M, S; coastal sandy shores. Distribution as for the genus.

64. ***Tripleurospermum*** Sch.Bip.

Annuals or herbaceous perennials; leaves alternate, pinnatisect; capitula solitary or in corymbs, pedunculate, radiate, disciform or discoid; receptacle convex to conical, epaleate; ray florets female, the limb white, rarely pinkish; corolla of disc florets 5-lobed; lobes each usually with a resin sac; achenes triquetrous, with 1 adaxial and 2 lateral thickish white ribs and sometimes 1-2 abaxial thin ribs, rugose or tuberculate between

the ribs, with apical resin sacs; pappus a corona or auricle, or of few scales, sometimes absent. 38 species, Europe, North Africa, temperate Asia, few naturalized in North America, 1 widespread weed.

1. **Tripleurospermum auriculatum** (Boiss.) Rech. f., Fl. Lowland Iraq 629 (1964).

Syn. *Chamaemelum auriculatum* Boiss., Diagn. Pl. Orient., ser. 1, 11: 23 (1849).

Glabrescent annual 10-25 cm; stems usually several and branched from the leafy base; leaves 0.5-2.5 x 0.3-0.6 cm, oblong-ob lanceolate in outline, 1-2-pinnatisect; lobes 0.5-2 x 0.25 mm, oblong-linear, subacute; peduncle 2.5-15 cm, scapiform, ebracteate, indurate in fruit; capitula 6.5-8 mm diam., subglobose, discoid; involucre 2.5-3 mm; phyllaries with a green sparsely hairy midrib, broadly scarious-margined, obtuse; outer 1.5-2 x 0.75 mm, narrowly ovate, the inner 2.5-3 x 0.6 mm, oblong-ovate; florets all tubular; corolla 1.5-2 mm, campanulate, yellow; achenes 1.25-1.5 x 0.6-0.75 mm, ± oblong, slightly curved; ribs white, the median thicker than the marginal, furrows thin and blackish; pappus 2-2.5 x 1-1.25 mm, of a membranous oblong-obovate auricle.

De, S; desert wadis. Egypt, Palestine, Lebanon, Syria, Iraq, Arabia.

### 65. *Matricaria* L.

Aromatic annuals; leaves alternate, finely pinnatisect; capitula solitary, pedunculate, radiate or disciform; receptacle conical, hollow, epaleate; ray florets female, fertile, with or without a white limb; corolla of disc florets 4- or 5-lobed, yellow; corolla-tube swollen in fruit; achenes slightly compressed, distinctly 5-ribbed on the ventral side, smooth on the dorsal; pappus a small membranous corona or auricle, or absent. 7 species, northern hemisphere especially Europe, Mediterranean region and Asia, some widespread weeds.

1. Capitula radiate; ray florets with white limbs  
+ Capitula disciform; all florets tubular, yellow

1. **M. recutita**

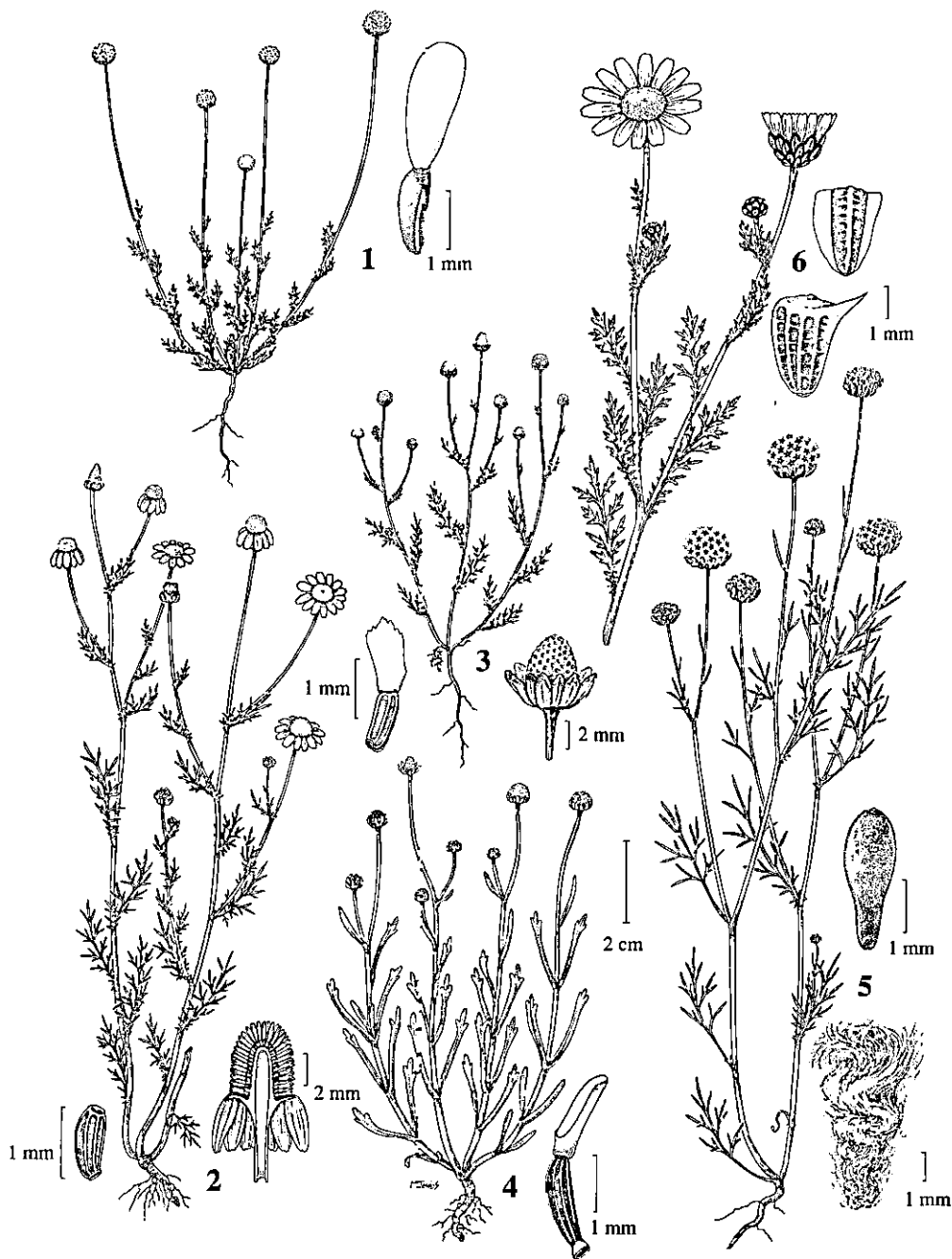
2. **M. aurea**

1. **Matricaria recutita** L., Sp. Pl., ed. 1, 891 (1753).

Syn. *Matricaria chamomilla* L., Sp. Pl., ed. 2, 1256 (1763) non L. (1753), nom. illeg.

Aromatic glabrous annual 15-40 cm; stems erect, usually branched, 4-angled, sulcate, leafy; leaves 2-5 x 0.5-1.5 cm, oblong-ob lanceolate to oblong in outline, 1-2-pinnatisect, lobes 1-8 x 0.2-0.5 mm, narrowly oblong-elliptic to linear, acute or mucronate; lower sessile, with an ill-defined short winged petiole which often bears minute lobes; upper sessile, clasping, with well-developed lobes to the base, the lowermost lobes auricle-like; peduncle 1-5 cm, ebracteate, indurate and elongate to 8(10) cm in fruit; capitula solitary, radiate, sweet-smelling; involucre subglobose; phyllaries imbricate, 2-3-seriate, 1.5-2.5 x 1-1.5 mm, greenish with pale brown scarious margins; limb 6-8 x 2.5-3 mm, oblong, 3-lobed, white, soon reflexed; corolla-tube c. 1 mm; disc florets yellow, the tube c. 1.5 mm; receptacle sharply conical, foveolate; achenes c. 1 x 0.4 mm, oblong-cylindrical, slightly curved, 5-ribbed, brownish, the apex epappose and truncate, or with a membranous, irregularly-lobed white auricle 1 mm.

Two varieties occur in Egypt:



**Plate 61.** COMPOSITAE: *Tripleurospermum auriculatum* 1, habit; achene (up right). *Matricaria recutita* 2, habit; flowering capitulum with hollow receptacle (down right); achene (down left). *Matricaria aurea* 3, habit; capitulum with conical receptacle (down right); achene (down left). *Chlamidophora tridentata* 4, habit; achene (down right). *Lasiospermum brachyglossum* 5, habit; exposed achene (middle right); achene embedded in woolly hairs, and dry ray limbs (down right). *Glebionis coronaria* 6; flowering branch; marginal achene (up right); inner achene (below the marginal). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

var. **recutita**

Achenes without an auricle, the apex truncate.

N, M, S; edges of cultivation, waste ground, roadsides.

var. **coronata** (Boiss.) Fertig in Feinbrun-Dothan, Fl. Palaest. 3: 344 (1978).

Syn. *Matricaria chamomilla* L. var. *coronata* Boiss., Voy. Bot. Espagne 2: 316 (1840).

For full synonymy see Meikle, Fl. Cyprus 2: 925 (1985).

Marginal achenes with an irregularly-lobed white auricle 1 mm.

N, M, S; edges of cultivation, waste ground, roadsides.

Area of the species: Atlantic Islands, Mediterranean region, Sinai, eastwards to northwest India.

NOTE: *Matricaria recutita* is cultivated in Egypt as a medicinal herb; some of the records of this species may be considered as naturalized or escape from cultivation. The presence or absence of auriculate (coronate) achenes, which separates the above two varieties has been questioned by Meikle, Fl. Cyprus 2: 925 (1985).

2. **Matricaria aurea** (Loefl.) Sch.Bip., Bonplandia 8: 369 (1860).

Syns. *Cotula aurea* Loefl., Iter Hisp. 163 (1758).

*Chamomilla aurea* (Loefl.) Coss. & Kralik, Cat. Pl. Syr. Palest. 10 (1854).

Like *Matricaria recutita*, but: plant 5-25 cm; stems slender; peduncle to 4 cm; capitula disciform, with all florets tubular, yellow; phyllaries with a conspicuous brownish margin; achenes 3-ribbed.

N, M, D, S; roadsides, waste ground, desert wadis and plains. Mediterranean region, eastwards to the Himalayas.

66. **Chlamydomophora** Ehrenb. ex Less.

Annuals; lower leaves opposite, the upper alternate, entire or tridentate, rather fleshy; capitula solitary, pedunculate, homogamous, discoid; receptacle convex, epaleate; corollas 4- or 5-lobed, yellow, sometimes reddish; corolla-tube swollen at the base, spongy in fruit; achenes fusiform, 10-ribbed, with secretory canals and vascular strands between the ribs, the apex crowned by an auricle as long as or longer than the achene. 1 species, Tunisia, Libya, Egypt, Palestine, Cyprus, Aegean Islands, Crete.

1. **Chlamydomophora tridentata** (Delile) Ehrenb. ex Less., Syn. 266 (1832).

Syns. *Balsamita tridentata* Delile, Descr. Egypte, Hist. Nat. 273, t. 47, f. 1 (1814).

*Cotula tridentata* (Delile) Dinsm. in Post, Fl. Pal. Syria, Sinai, ed. 2, 2: 65 (1933).

Glabrous annual 5-25 cm; stems branched from the base; leaves linear-oblongate, rather fleshy, the lower opposite, the bases of lower leaves connate to form a cupule around the stem, upper alternate, entire or 3-lobed at the apex, sessile, amplexicaul;

peduncle 2-8 cm, slender, ebracteate; involucre 7-9 mm diam., phyllaries 2-4 x 1.5-2 mm, oblong, loosely imbricate, with a green midrib and scarious margins; receptacle convex, glabrous, epaleate; corolla c. 2 x 0.5 mm, tubular, 5-lobed at the apex, yellow; achenes c. 1.5 x 0.5 mm, fusiform, slightly curved, 10-ribbed, with a short basal stipe; auricle c. 2 x 1.2 mm, spathe-like, membranous, white.

M; saline soils, edges of salt marshes. Distribution as for the genus.

NOTE: The type of *Balsamita tridentata* was collected in Egypt, "près d'Alexandrie, aux environs de la colonne de Pompée et du lac Mareotis" (MPU), fide Meikle, Fl. Cyprus 2: 926 (1985).

## 67. *Lasiospermum* Lag.

Annuals or herbaceous perennials; leaves alternate, pinnatisect; capitula solitary, pedunculate, radiate or discoid; receptacle flat or convex, paleate; paleae thin, scarious, with a conspicuous resin canal; ray florets female, fertile; limb white or reddish; corolla of disc florets 5-lobed, the lobes sometimes reddish; achenes copiously villous, with resin canals, epappose. 4 species, South Africa, Namibia, Saudi Arabia, Sinai, Palestine.

### 1. *Lasiospermum brachyglossum* DC., Prodr. 6: 38 (1838).

Glabrous annual 10-30 cm; stems erect, usually several from the base, branched, leafy, 4-angled, sulcate; leaves 2-5.5 x 0.5-1.5 cm, oblanceolate in outline, 1-2-pinnatisect, tapering to a narrowly winged petiole, clasping, the lower with short acute auricles; leaflobes 0.3-2 x 0.05-0.1 cm, narrowly linear, acute or mucronate; peduncle 1-7 cm, ebracteate, slender in flower and fruit; capitula 1-1.2 cm diam. at anthesis, radiate, becoming 1.5-1.8 cm diam. in fruit, and exposing the dense white-woolly achenes and remnants of dry ray limbs; involucre c. 6 mm diam., subglobose; phyllaries c. 10, loosely imbricate, 2-seriate, 2-3 x 1-1.25 mm, oblong-ovate, obtuse, olive-green, scarious-margined, unchanged in fruit; limb c. 3 x 1.5 mm, white, drying red; disc florets c. 3 mm, campanulate; corollas yellow, drying blackish-red; achenes 1.75-2 x 0.6-0.75 mm, narrowly ovoid-ellipsoid, glabrous, lustrous, brownish, epappose, embedded in dense, woolly, rather compact hairs.

S; gravelly ground, in the mountains. Sinai, Palestine, western Saudi Arabia, South Africa, Namibia.

NOTE: *Lasiospermum brachyglossum*, a disjunct species known formerly from Sinai and South Africa, (Täckholm, 1974; Bremer and Humphries, 1993; Boulos, 1995), was classified under two varieties: var. *brachyglossum* from South Africa and var. *sinaicum* Asch. & P. Hoffm. from Sinai. We were unable to trace any specimens from Sinai. However, three other specimens were examined: two from Saudi Arabia (Collenette 5674 & 8530, K!) and one from Jordan (Davis 9297, K!). We compared these with South African material (several collections) and they all seem to be almost identical. Therefore we consider that var. *sinaicum* is not worth maintaining as it is not distinguishable from var. *brachyglossum*. The species is now known from two other Middle Eastern countries (and Namibia), and probably future finds may provide more information about its distribution. As to its systematic position, Bremer and Humphries, *l.c.*, noted: "*Lasiospermum* is a well defined genus with copiously villous cypsellas and the development of cypsella wool deserves detailed investigation".

## 68. *Glebionis* Cass.

Annuals; leaves alternate, serrate-dentate to pinnatisect, slightly clasping; capitula solitary or laxly corymbose, pedunculate, radiate; involucre subspherical; phyllaries imbricate, wide, many-veined, with resin canals; receptacle convex, epaleate; ray florets female, fertile, the limb yellow or white; corolla of disc florets 5-lobed, the lobes with central resin sacs; achenes dimorphic: marginal achenes triquetrous, laterally winged; inner achenes prismatic with a narrow wing, or terete with a thick undulating wall, thus appearing ribbed; all achenes epappose. 2 species, North Africa, Europe, western Asia, 1 widespread weed.

### 1. *Glebionis coronaria* (L.) Tzvelev, Bot. Zhurn. 84 (7): 117 (1999).

Syn. *Chrysanthemum coronarium* L., Sp. Pl., ed. 1, 889 (1753).

Glabrous annual 10-50 cm; stems usually branched, erect, sulcate; leaves 2-5.5 x 0.5-2.5 cm, oblong-ob lanceolate, 2-pinnatisect, the lobes oblong to triangular, apiculate; peduncle 1.5-6 cm; capitula terminal; involucre 1.5-2 cm diam.; phyllaries loosely imbricate, 4-seriate, the outer 3-5 x 2 mm, broadly ovate, obtuse, scarious-margined; inner 1-1.4 x 0.3-0.4 cm, oblong, apex rounded, margin broadly scarious; receptacle strongly convex; ray florets with limbs 1-1.5 x 0.5-0.7 cm, yellow, or whitish with yellow at the base; corolla-tube 3-4 mm; marginal achenes c. 3 x 2.5 mm, sharply triquetrous, the angles narrowly winged, brown; inner achenes c. 3.5 x 2.5 mm, laterally compressed, the abaxial face with 1 broad wing, the lateral faces 3-ribbed; all achenes epappose.

N, M, S; barley fields, edges of cultivation, roadsides, waste ground. Mediterranean region, Sinai, eastwards to Iran.

## 69. *Tanacetum* L.

Syns. *Balsamita* Mill., *Gymnocline* Cass., *Hemipappus* K. Koch, *Pyrethrum* Zinn, *Spathipappus* Tzvelev

Perennials, rarely annuals or low shrubs; leaves alternate, rarely forming rosettes, pinnatifid to pinnatisect, rarely entire; capitula solitary or in corymbose inflorescences, radiate, disciform or discoid; phyllaries sometimes with dark brown margin; receptacle flat or convex, epaleate; ray florets female or neuter; limb yellow, white or pink; corolla of disc florets 5-lobed; achenes generally oblong, 5-12-ribbed, often with sessile glands; pappus a short or well-developed corona, sometimes of short free scales. 152 species, Europe, Mediterranean region, temperate Asia, North America, introduced into the southern hemisphere.

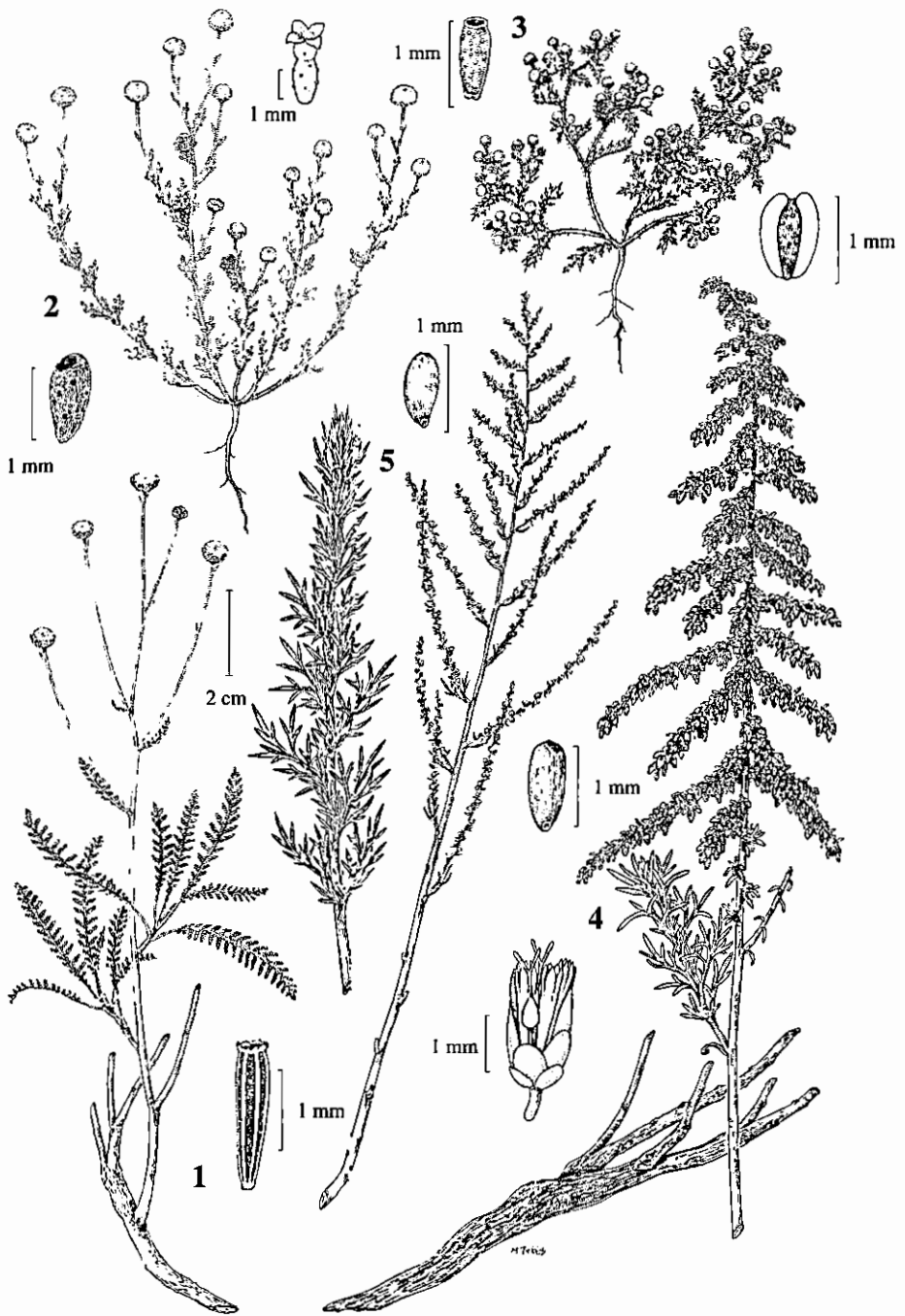
### 1. *Tanacetum sinaicum* (Fresen.) Delile ex Bremer & Humphries, Bull. Nat. Hist. Mus. Lond. (Bot.) 23 (2): 103 (1993).

Syns. *Santolina sinaica* Fresen., Mus. Senkenb. 1: 83 (1833).

*Pyrethrum santolinoides* DC. in Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 264 (1834).

*Tanacetum santolinoides* (DC.) Feinbrun & Fertig, Israel J. Bot. 25: 82 (1976).

Aromatic tomentose-canescens low shrub, 20-50 cm; stems many from the woody base, erect, leafy, slender, becoming stiff; leaves 2-10 x 0.5-1.5 cm, oblong-elliptic in outline,



**Plate 62. COMPOSITAE:** *Tanacetum sinicum* 1, flowering and fruiting branch; achene (down right). *Cotula cinerea* 2, habit; achene (down left); floret (up within). *Cotula anthemoides* 3, habit; marginal winged achene (right); inner achene (up left). *Artemisia monosperma* 4, flowering and fruiting branch with leafy branchlet, and woody base; capitulum (down left); achene (middle left). *Artemisia scoparia* 5, flowering and fruiting branch; leafy branch (left); achene (up left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.



pinnatisect into 10-15 pairs of lobes; lobes 1.5-6 x 1-1.5 mm, oblong in outline, pinnatifid into suborbicular lobules; inflorescence corymbose, lax, with 3-6 capitula; peduncle 3-10 cm, bracteate, slender, indurate in fruit; capitula disciform or radiate with a few short limbs; involucre 5-7 mm diam., subglobose; phyllaries 3-seriate, with a green tomentose midrib and scarious margins; outer 2-3 x 1-1.5 mm, oblong-ovate, obtuse, the inner 4-4.5 x 1.5 mm, oblong, the apex obtuse and broadly scarious; disc florets 4-5 mm, yellow; achenes 2-2.5 x 0.4-0.5 mm, narrowly obconical, conspicuously ribbed, glandular-punctate, the marginal achenes slightly curved; pappus of a very short denticulate corona.

S; stony ground in the mountains. Sinai, Palestine, Saudi Arabia.

NOTE: The type of *Santolina sinaica* was collected in the mountain region of Sinai.

#### 70. *Cotula* L.

Syns. *Brocchia* Vis., *Cenia* Comm. ex Juss., *Otochlamys* DC.,  
*Sphaeroclinium* (DC.) Sch.Bip.

Annual or perennial herbs; leaves alternate, sometimes opposite or rosulate, pinnatisect or lobed, rarely entire; capitula solitary, pedunculate, disciform or discoid, rarely shortly radiate; receptacle flat or conical, epaleate; ray florets in 1- to several series, female, fertile; corolla-tube short or absent; limb generally absent, white if present; corolla of disc florets usually 4-lobed, sometimes saccate, one lobe occasionally expanded into a limb; achenes flattened, often laterally winged; pappus absent. 55 species, mainly southern hemisphere: South Africa, Australia, South America, southern oceanic islands, few in East and North Africa and Mexico, some widespread weeds.

- 1. Leaf-lobes entire; phyllaries densely woolly;  
marginal female florets few or absent 1. *C. cinerea*
- + Leaf-lobes serrate; phyllaries glabrous;  
marginal female florets 5-6-seriate 2. *C. anthemoides*

1. *Cotula cinerea* Delile, Descr. Egypte, Hist. Nat. 275, t. 47, f. 4 (1814).  
Syns. *Brocchia cinerea* (Delile) Vis., Pl. Aegypt. Nub. 35 (1836).  
*Tanacetum cinereum* (Delile) DC., Prodr. 6: 131 (1838).

Densely grey-canescens annual, 10-25 cm; stems many from the base, branched, leafy, ascending; leaves 0.3-1.2 x 0.1-0.6 cm, oblong in outline and 4-6-lobed, or 3-lobed at the apex, the lobes oblong-elliptic, entire, subacute; uppermost leaves smaller undivided, oblong-linear; peduncle 1-5 cm, ebracteate; capitula discoid, 6-8 mm diam., subglobose; involucre 2.5-3.5 mm; phyllaries 2-seriate, imbricate, densely woolly, scarious towards the apex; receptacle conical, epaleate; florets c. 2 mm, 4-lobed, yellow; achenes 1-1.2 x 0.4-0.6 mm, oblong-oblancheolate, sparsely glandular-punctate, striate; pappus absent.

M, D, R, S; desert wadis and sandy plains. Central Sahara, North Africa, Sinai, Palestine, Arabia, Sudan, Ethiopia.

NOTE: The type of *Cotula cinerea* was collected in the sandy plains of the Giza Pyramids, Egypt.

2. *Cotula anthemoides* L., Sp. Pl., ed. 1, 891 (1753).  
Syn. *Cotula microcephala* DC., Prodr. 6: 79 (1838).

Sparsely pilose green annual, 5-20 cm; stems much-branched from the base, diffuse, sulcate, leafy; leaves 0.5-3 x 0.2-1.2 cm, oblong in outline, sessile, clasping, pinnatisect into 5-14 serrate lobes, the ultimate lobes apiculate; peduncle 0.3-1.5 cm, slender, ebracteate; capitula disciform, 4-5 mm diam., subglobose; involucre c. 2 mm; phyllaries 1-2-seriate, 1.5-2 x 0.75 mm, oblong-elliptic, the margins scarious, the apex obtuse, glabrous; receptacle ± flattened, epaleate; florets c. 0.8 mm, yellow, the marginal female, 5-6-seriate, the inner bisexual; marginal achenes 0.8-1 x 0.6 mm, obovate, flattened, winged, achene body glandular-punctate; inner achenes c. 0.75 x 0.4 mm, narrowly obovate, flattened.

N, M, De, S; waste moist ground, edges of cultivation, muddy streams and canal banks. North Africa to Northwest India and southwest China, southwards through Africa, adventive in southern Europe.

### 71. *Artemisia* L.

Annuals, perennials or shrubs; leaves alternate, variously lobed or dissected, rarely entire; capitula disciform, usually in long panicles, or inflorescence much reduced and racemose, spicate or subglobose; receptacle flat or conical, epaleate; marginal florets female, usually tapering above, with 2-4 teeth or truncate; inner florets bisexual and fertile or female-sterile and functionally male; corolla 5-lobed, yellow, sometimes purplish; anthers with apical subulate appendage; achenes obovoid, usually glabrous or occasionally hairy; pappus absent. 388 species, mainly northern hemisphere in temperate Eurasia and western North America, few in South America, Africa south of the Sahara and Hawaii.

1. Plant densely greyish-tomentose 3. *A. judaica*  
 + Plant glabrous or sparsely pilose, green or glaucous 2

2. Annual; flowering capitula 1-1.5 mm diam., globose 2. *A. scoparia*  
 + Low shrub; flowering capitula 2.5-3 mm diam., broadly ovoid 1. *A. monosperma*

1. *Artemisia monosperma* Delile, Descr. Egypte, Hist. Nat. 263, t. 43, f. 1 (1814).

Glaucous, glabrous low shrub, 0.4-1.2 m; stems numerous, branched, erect or ascending, sulcate; leaves 0.6-2.5 (3.5) x 0.2-1.8 cm, rather fleshy, variable: those of vegetative branchlets oblanceolate in outline, pinnatisect, with linear acute lobes 0.2-1.5 cm, or sometimes linear-oblong to 3.5 x 0.3 cm, slightly clasping at the base; leaves of flowering branches 2-6 x 1 mm, linear, mucronate; inflorescence 12-30 x 15 cm, paniculate, pyramidal; peduncle 0-3 mm; capitula 3-3.5 x 2.5-3 mm, broadly ovoid, numerous, nodding on 1-sided racemose branches; involucre glabrous; phyllaries 2-seriate, imbricate, scarious-margined, the outer c. 1 x 1 mm, ± orbicular, the inner c. 2 x 1.5 mm, broadly ovate; marginal female florets 2; inner florets functionally male, 5-dentate; achenes c. 1 x 0.4 mm, obovoid, faintly striate, brownish, usually only one achene ripening per capitulum (hence the epithet *monosperma*), epappose.

M, D, S; sandy plains and desert wadis. Libya, Egypt, Palestine, Lebanon, Syria, Iraq, Arabia.

NOTE: The type of *Artemisia monosperma* was collected in Wadi Natrun, Egypt, by M. Réduit. It is a widespread species in the desert plains and wadis, both inland and within

the Mediterranean coastal region, often not too far from the coast in northern Sinai. The basal woody parts of old plants are used as firewood by the Bedouin and the leaves are used in folk medicine.

## 2. *Artemisia scoparia* Waldst. & Kit., Pl. Rac. Hung. 1: 66, t. 65 (1801).

Aromatic, green, glabrous, or sparsely pilose annual (in Egypt) or short-lived perennial with a woody base (in other countries), 20-60 cm; stems branched, erect, usually reddish, terete, sulcate; leaves 1.5-5 x 0.6-2 cm, oblanceolate in outline, 1-2-pinnatisect into linear to filiform, acute segments, slightly clasping at the base; inflorescence paniculate; peduncle 0-2 mm; flowering capitula 1-1.5 mm diam., globose, becoming c. 2 mm diam. in fruit, numerous, nodding; involucre glabrous; phyllaries 2-seriate, slightly imbricate, green, the outer 0.8-1 x 0.6-0.8 mm, broadly ovate, narrowly scarious-margined; the inner phyllaries c. 1.5 x 1.25 mm, suborbicular, scarious-margined; marginal florets female, filiform, the inner bisexual, functionally male; corolla pinkish; achenes c. 1 x 0.4 mm, narrowly obovoid, faintly seriate; pappus absent.

M (Alexandria), S (Sadd El-Rawaf'aa); Central and eastern Europe, Egypt, southwest Asia, Siberia.

NOTE: *Artemisia scoparia* is only known from two localities in Egypt: Alexandria and Sadd El-Rawaf'aa in northern Sinai, apparently at the southwest edge of its distribution. It is not recorded from Palestine according to Feinbrun-Dothan (1978).

## 3. *Artemisia judaica* L., Mant. Alt. 281 (1771).

Strongly aromatic, densely greyish-tomentose low shrub, 30-80 cm; stems much-branched from the base, terete, becoming woody; leaves 0.5-2 x 0.4-1.6 cm, variable; those of vegetative shoots broadly ovoid in outline, petiolate, 1-2-pinnatipartite to -pinnatisect, the ultimate segments oblanceolate to elliptic, obtuse; leaves of flowering branches small, clustered, pinnatifid or lobed at the apex; inflorescence paniculate; peduncle 0-3 mm; capitula 3-3.5 mm diam., subglobose, numerous, on dense racemose branches; involucre tomentose; phyllaries 2-seriate, 1-1.5 x 1-1.5 mm,  $\pm$  orbicular, imbricate, the margins scarious, the apex rounded; florets yellow, all fertile; achenes 0.8-1 x 0.3 mm, narrowly obovoid, striate, glabrous, epappose.

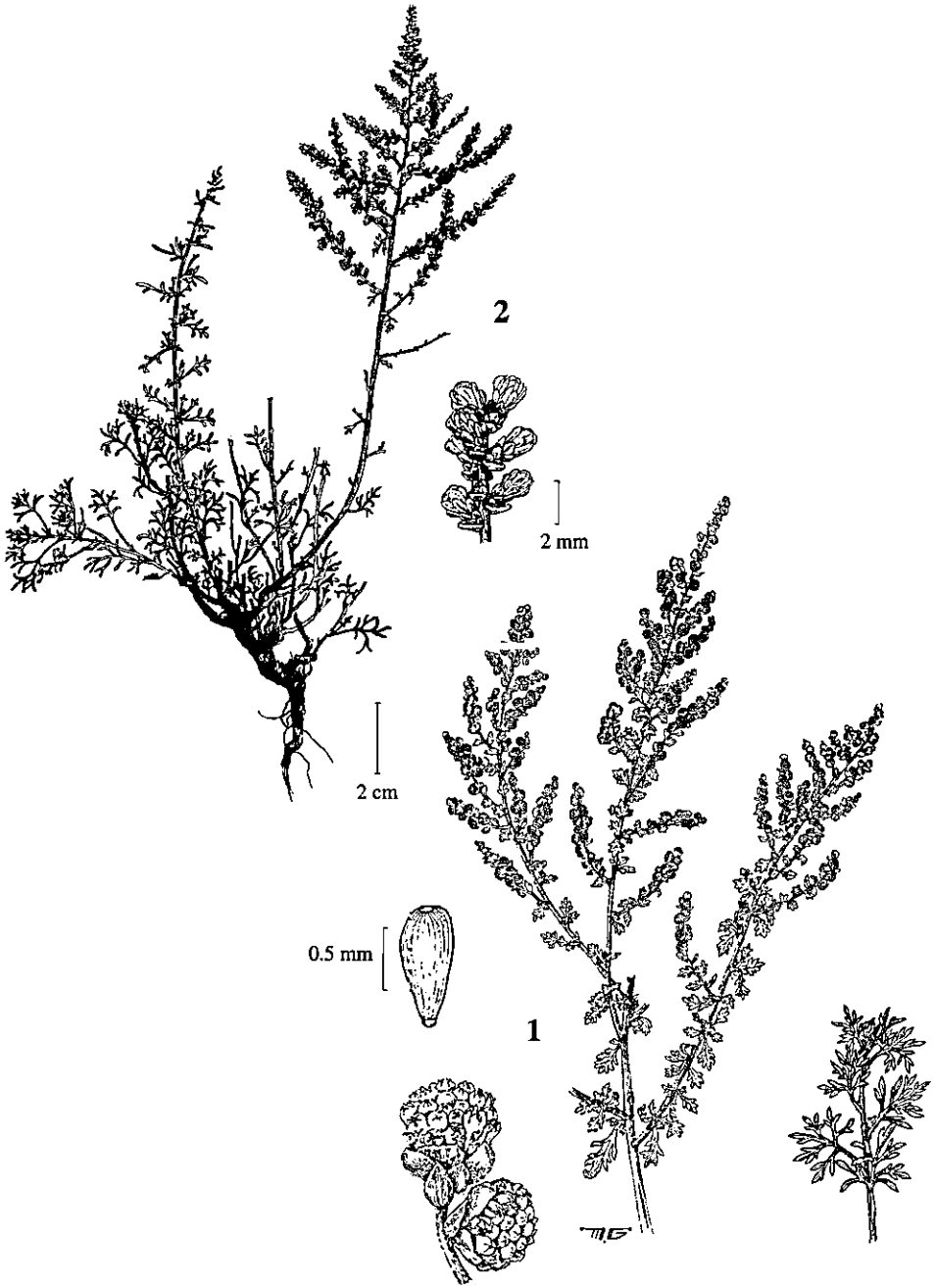
M, D, R, GE, S; wadi beds, terraces and stony desert plains. Sahara, Algeria, Libya, Chad, Egypt, Palestine, Arabia.

NOTE: The leaves and capitula are used in folk medicine.

### *Imperfectly known species:*

## *Artemisia vulgaris* L., Sp. Pl., ed. 1, 848 (1753).

Aromatic perennial 0.4-1.5 m; stems erect, branched, sulcate, pilose; leaves 2.5-10 x 0.4-5 cm, the cauline 1-pinnatisect; lobes entire, densely white-felted beneath, green above, entire, the lowermost pair amplexicaul; uppermost leaves smaller than the cauline, linear-lanceolate, acute, with 2 small basal clasping lobes; inflorescence a lax panicle; peduncle 0-8 mm, ebracteate; capitula 3-4 mm diam.; phyllaries 2-seriate, 3-4 mm, the outer c. 3 x 1 mm, narrowly ovate, obtuse, scarious-margined, the inner c. 4 x 1 mm, oblong-lanceolate, obtuse, tomentose; marginal florets female, filiform; the inner florets bisexual, fertile; corolla reddish; achenes not seen.



**Plate 63.** COMPOSITAE: *Artemisia judaica* 1, flowering and fruiting branch; branchlet with two capitula and achene (left); basal leaf (down right). *Seriphidium herba-album* 2, habit; flowering branchlet (right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Magdy El-Gohary.

N; orchards. North Africa, Europe, Turkey, eastwards to Caucasus, northern Iraq, Iran, Siberia, introduced into North America.

NOTE: This species is known in Egypt from a single collection: Kafr El-Rigalat, near Banha, Nile delta, 14 September 1980, S. El-Khanagry, *s.n.*, (CAIM, K!).

**Artemisia verlotiorum** Lamotte, Mém. Assoc. Franc. Congr. Clermont-Ferrand 511 (1876).

The occurrence of this species in Egypt is based on one collection: Giza, near the Pyramids, mango orchard, 7 October 1995, M. N. El-Hadidi, *s.n.* (K!).

NOTE: *Artemisia verlotiorum* is very closely allied to *Artemisia vulgaris* and often very difficult to separate according to Hind *et al.*, Flore des Mascareignes 109. Composées 126 (1993). They add that even if the numerous distinctive characters given by Brenan in *Watsonia* 1: 209-223 (1950) are utilized, they are still difficult to separate, and perhaps the most distinctive difference is: the smaller veins, as well as the midribs and lateral veins of the leaves of *A. verlotiorum* are clearly translucent by transmitted light in living and dried specimens, while in *A. vulgaris* they are not as pronounced. More collections are desired to ascertain their distribution in Egypt and whether or not they are naturalized.

72. **Scriphidium** (Besser ex Hook.) Fourr.  
Syn. *Artemisiastrum* Rydb.

Annuals, herbaceous perennials or low shrubs; leaves alternate, pinnatisect; inflorescence a long panicle; capitula small, few-flowered; phyllaries 4-7-seriate, unequal, the outer short and  $\pm$  rounded, the inner gradually longer and unequal; receptacle small, conical, epaleate or occasionally paleate; corolla 5-lobed, tubular, yellow to purple; apical anther-appendage linear or narrowly lanceolate; achenes small, obovoid to ellipsoid, slightly flattened or triquetrous, thin-walled. 134 species, Europe, North Africa, temperate Asia, North America, but especially Central Asia.

1. **Scriphidium herba-album** (Asso) Soják, Cas. Nár. Muz. (Prague) 152 (1): 22 (1983).  
Syns. *Artemisia herba-alba* Asso, Syn. Arag. 117 (1779).  
*Artemisia arragonensis* Lam., Encycl. 2: 269 (1783).  
*Artemisia inculta* Delile, Descr. Egypte, Hist. Nat. 264 (1814) nom. nud.  
*Artemisia herba-alba* Asso var. *tenuiflora* Boiss., Fl. Orient. 3: 365 (1875).

Strongly aromatic, greyish-white tomentose low shrub, 20-50 cm; stems many from the base, branched, erect, herbaceous, becoming rigid, woody when old; leaves 0.5-3 x 0.1-1.5 cm, variable: those on vegetative branches oblanceolate in outline, 1-2-pinnatisect, tapering to a winged petiole, the ultimate segments oblong; those on flowering branches much smaller, few-lobed at the apex, or simple and minute; inflorescence paniculate, with spreading branches; capitula 3-4 x 1.2-1.5 mm,  $\pm$  narrowly cylindrical, slightly attenuate at the base; involucre herbaceous, tomentose; phyllaries 4-7-seriate, imbricate, the outer 0.5-1 x 0.5-0.8 mm, broadly ovate or  $\pm$  rounded; inner gradually longer, to 2.5 x 0.8 mm, oblong, scarious-margined, obtuse; florets 2-4 per capitulum, all bisexual; corolla reddish, glabrous; achenes not seen.

M, D, R, S; sandy and stony deserts and calcareous ridges. Southern France, Spain, Crete, North Africa, Sinai, Palestine, Syria, Arabia, Iran.

### 73. *Senecio* L.

Literature: Alexander, J.C.M. 1979. The Mediterranean species of *Senecio* sections *Senecio* and *Delphinifolius*. Notes Roy. Bot. Gard. Edinb. 37: 387-428.

Annual (our species), biennial or perennial herbs, shrubs or climbers; leaves alternate, entire, dentate, lobed or pinnatisect; inflorescence paniculate or corymbose; capitula heterogamous and radiate, or homogamous and discoid; ray florets female; disc florets bisexual; receptacle flat or convex, naked; involucre campanulate or cylindrical; phyllaries 1-seriate, generally with a basal calyculus of supplementary bracts; ray florets mostly yellow, sometimes purple, 1-seriate; disc florets tubular, 4-5-lobed at the apex; anthers rounded at the base or sometimes shortly appendiculate; achenes mostly terete,  $\pm$  cylindrical, glabrous or pilose, 5-10-ribbed, truncate; pappus of silky scabridulous hairs. About 1250 species, worldwide, but especially South America and Africa, some widespread weeds.

- |   |   |
|---|---|
| 1. Leaves coarsely dentate, not lobed<br>+ Leaves pinnatifid to pinnatisect   | 1. <i>S. flavus</i><br>2                        |
| 2. Rays purple<br>+ Rays yellow or absent   | 6. <i>S. hoggariensis</i><br>3                  |
| 3. Capitula conspicuously radiate<br>+ Capitula not or inconspicuously radiate  | 2. <i>S. glaucus</i><br>4                       |
| 4. Achenes glabrous<br>+ Achenes hairy  | 5. <i>S. belbeysius</i><br>5                    |
| 5. Capitula cylindrical after anthesis; phyllaries 6-8 mm;<br>pappus 5-6 mm<br>+ Capitula conical after anthesis; phyllaries 3.5-4 mm;<br>pappus 1.5-2 mm | 3. <i>S. vulgaris</i><br>4. <i>S. aegyptius</i> |

1. *Senecio flavus* (Decne.) Sch. Bip. in Webb & Berthel., Phyt. Canar. 3: 317 (1847).  
Syns. *Crassocephalum flavum* Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 265 (1834).  
*Senecio decaisnei* DC., Prodr. 6: 342 (1838).

Glabrous glaucescent annual 10-35 cm; stems erect, divaricately branched; leaves 1.5-7 x 0.5-3 cm, coarsely dentate, not lobed, rather fleshy, often reddish-violet; lower leaves broadly ovate, petiolate, the upper cauline cordate, sessile, clasping; capitula in lax corymbose inflorescences, discoid or short-rayed; involucre cylindrical, brownish; phyllaries 6.5-9 x 0.75 mm, linear, scarious-margined, the apex subacute and ciliate; basal calyculus bracts few, 0.5-1 mm; achenes c. 2.5 x 0.5 mm,  $\pm$  cylindrical, distinctly ribbed, densely appressed-hirtellous; pappus c. 4 mm, of scabridulous hairs, deciduous.

De, R, GE, S; sandy and stony desert wadis and plains. Morocco, Algeria, Chad, Sudan, Egypt, Palestine, Arabia, Iran, Baluchistan, Afghanistan.

2. *Senecio glaucus* L., Sp. Pl., ed. 1, 868 (1753).

Annual 10-50 cm, almost glabrous; juvenile growth slightly cobwebby and later glabrescent, or sparsely arachnoid; stems erect or ascending, much-branched, terete,

sulcate; leaves 2-8(12) x 0.5-3(6) cm, oblong-lanceolate in outline, rather fleshy, pinnatisect into remote linear lobes, the margins revolute, the lobes entire, dentate or secondarily lobed; tips of lobes acute or rounded and 3-furcate; basal leaves petiolate, the upper sessile, clasping or auriculate; capitula in lax corymbs, conspicuously radiate; involucre cylindrical, green; phyllaries 4.5-8 x 0.6-0.8 mm, linear, acuminate, scarious-margined, glabrous; basal calyculus of (0)1-12 bracts, 1-3.5 mm, subulate; ray florets female; ray limbs 0.8-1.2 x 0.25-0.35 cm, yellow; disc florets c. 4 x 1 mm; achenes 2-3 x 0.5-0.7 mm, cylindrical-fusiform, ribbed, the apex truncate, brownish-black, appressed white-strigose; pappus 4-5.5 mm, of scabridulous white hairs, deciduous.

Two subspecies occur in Egypt:

subsp. **glaucus**

Syns. *Senecio vernalis* Waldst. & Kit. var. *carneus* Post, Fl. Syr. Pal. Sinia, ed. 1, 442 (1896).

*Senecio joppensis* Dinsm. in Post, Fl. Syr. Pal. Sinai, ed. 2, 2: 69 (1933).

Middle cauline leaves more than 6 cm, if shorter then plant sparsely arachnoid; lobes dentate and 2-3-furcate at the tip; capitula often indurate at base; phyllaries 6-8 mm.

M, D, S; sandy soils, desert wadis. East Mediterranean region, Sinai.

subsp. **coronopifolius** (Maire) C. Alexander, Notes Roy. Bot. Gard. Edinb. 37: 412 (1979).

Syns. *Senecio coronopifolius* Desf., Fl. Atlant. 2: 273 (1799), nom. illeg., non Burm.f. (1768).

*Senecio laxiflorus* Viv., Fl. Libyc. Spec. 55, t. 11, f. 3 (1824).

*Senecio desfontainei* Druce, Brit. Pl. List, ed. 2, 61 (1928).

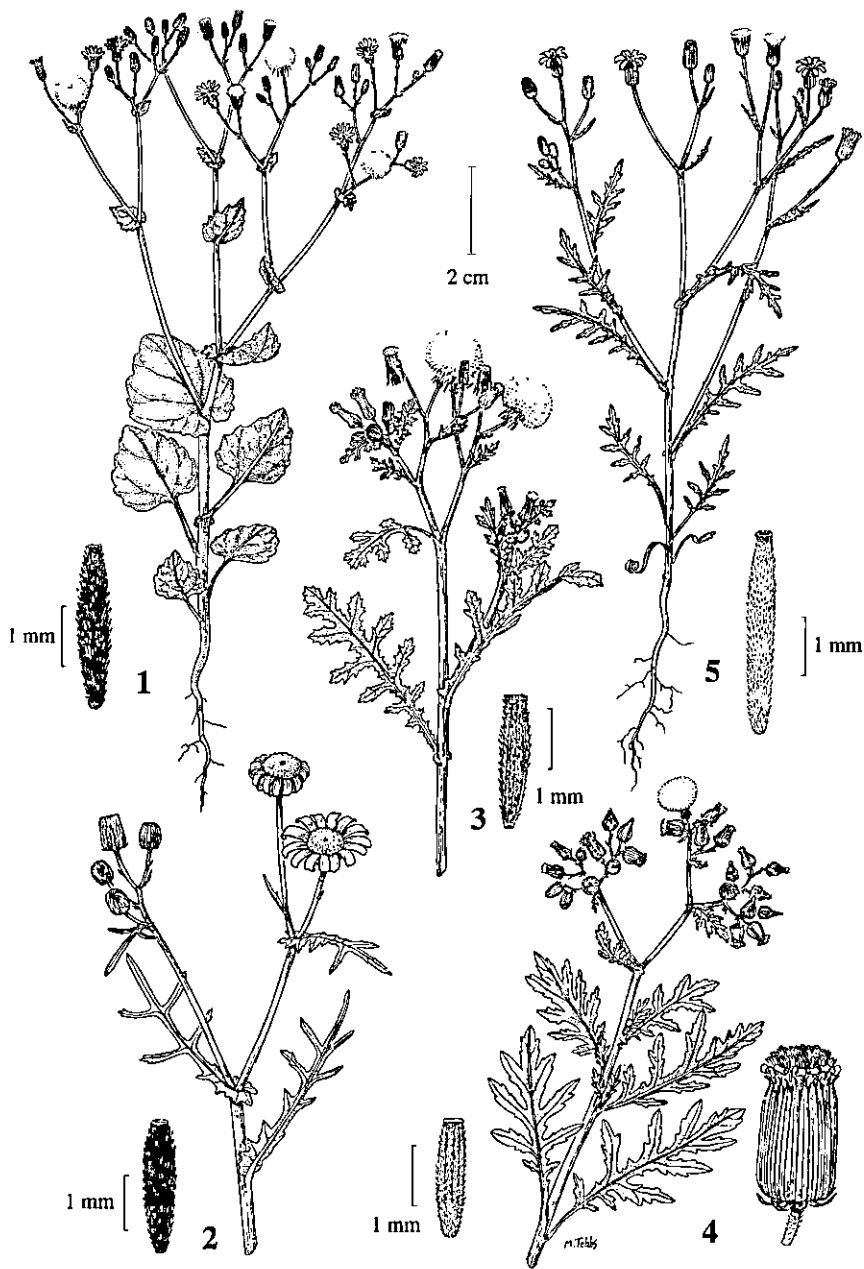
Middle cauline leaves less than 6 cm; plant glabrous or very sparsely pubescent; lobes entire or with small remote teeth, the tips simple, acute; capitula never indurate at base; phyllaries 4.5-6 mm.

N, O, M, D, R, S; coastal sandy and saline soils, desert wadis, edges of cultivation, waste ground, orchards. Canary Islands, Sicily, North Africa, Sinai, Palestine, Lebanon, Syria, Iraq, Arabia, Iran, Afghanistan, Pakistan.

NOTE: The type of *Senecio glaucus* subsp. *glaucus* was collected in Egypt "Hab. in Aegypto". Herb. LINN. 996. 24, fide Alexander, p. 412 (1979). *Senecio glaucus* subsp. *coronopifolius* is much more widespread throughout Egypt than subsp. *glaucus*.

3. **Senecio vulgaris** L., Sp. Pl., ed. 1, 867 (1753).

Glabrous or sparsely pilose annual, 10-30 cm; stems erect or ascending, much-branched,  $\pm$  4-angled, sulcate, rather succulent; leaves 2-10 x 0.5-3.5 cm, the lower spatulate in outline, coarsely dentate or pinnatifid, tapering to a winged petiole; cauline leaves oblong, pinnatifid to pinnatisect into remote oblong lobes with denticulate margins and acute apex, sessile, clasping, auriculate; capitula radiate or discoid, in corymbose inflorescences, cylindrical after anthesis; involucre cylindrical, green; phyllaries 6-8 x 0.6-0.8 mm, linear, narrowly scarious-margined, the apex acute and often blackish; basal calyculus bracts 10-16, imbricate, 1-3 mm, black towards the acute apex; achenes 2.2-2.5



**Plate 64. COMPOSITAE:** *Senecio flavus* 1, habit; achene (down left). *Senecio glaucus* subsp. *coronopifolius* 2, flowering branch; achene (down left). *Senecio vulgaris* 3, flowering and fruiting branch; achene (down right). *Senecio aegyptius* 4, flowering and fruiting branch; capitulum of var. *aegyptius* with ray florets (down right); achene (down left). *Senecio hoggariensis* 5, habit; achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbis.



x 0.5 mm, cylindrical-ellipsoid, ribbed, appressed-hirtellous, the apex truncate; pappus 4.5-5.5 mm, of scabridulous white hairs, deciduous.

N, O, M, De; edges of cultivation, roadsides, waste ground. Europe, North Africa, southwest Asia, introduced to many temperate regions.

4. **Senecio aegyptius** L., Sp. Pl., ed. 1, 867 (1753).

Glabrescent annual 15-50 cm; stems usually much-branched, sulcate; leaves 3-8 x 1.5-4 cm, the lower cauline elliptic in outline, dentate or pinnatifid, petiolate; upper cauline leaves broadly ovoid-elliptic in outline, pinnatipartite to pinnatisect, shortly petiolate, the lobes coarsely dentate; uppermost leaves smaller, sessile, clasping, auriculate; capitula in dense corymbose inflorescences, cylindrical, becoming conical after anthesis; phyllaries 3.5-4 x 0.5 mm, linear, acute, very narrowly scarious-margined, green, glabrous, not reflexed in fruit; calyx of 4-10 linear-lanceolate bracts 1-1.5 mm; ray florets present or absent; achenes c. 2 x 0.5 mm, ± cylindrical, ribbed, white-strigulose, brownish-black, the apex truncate; pappus c. 2 mm, of white scabridulous hairs, deciduous.

Two varieties occur in Egypt:

var. **aegyptius**

Syn. *Senecio triflorus* L., Sp. Pl., ed. 1, 867 (1753).

Ray florets present.

N, O, De (along canals). Southern France, Cyprus, Egypt, Sudan.

var. **discoideus** Boiss., Fl. Orient. 3: 388 (1875).

Syns. *Senecio arabicus* L., Mant. 114 (1767).

*Senecio verbenaefolius* Jacq., Hort. Vindob. 1: 2, t. 3 (1770).

*Senecio aegyptius* L. var. *verbenaefolius* (Jacq.) Boiss., Fl. Orient. 3: 386 (1875).

Ray florets absent.

N, O, De (along canals). Southern France, Cyprus, Egypt, Sudan.

NOTE: The type of *Senecio aegyptius* was collected in Egypt, "habitat in Aegypt. Herb. LINN. 996. 13. Syntypes of var. *discoideus* were collected in Egypt; Beni Suef, Aucher-Eloy 3434; Kralik s.n.; Thebes (Luxor), Bornmüller 10704 (E); Davis 60956 (E); 2nd Cataract, Scott Elliot 3328 (E), fide Alexander, p. 419 (1979).

5. **Senecio belbeysius** Delile, Descr. Egypte, Hist. Nat. 126, t. 45, f. 3 (1814).

Syns. *Senecio belbeyticus* Poir., Encycl. Suppl. 5: 129 (1817).

*Acleia belbeysia* (Delile) DC., Prodr. 6: 340 (1838).

Like *Senecio vulgaris*, but leaves narrower and less dissected; capitula smaller, ± globose; phyllaries 5-6 mm; achenes glabrous.

N; edges of cultivation. Endemic.

NOTE: The type of *Senecio belbeysius* was collected near Belbeis, "dans les champs humides, près de la ville de Belbeys", Egypt by Delile. According to Alexander, Notes Roy. Bot. Gard. Edinb. 37: 420 (1979), the status of *Senecio belbeysius* is not at all clear, and he proposed that it could possibly be of a hybrid origin. He also believed that it is nearest to *S. aegyptius*, and stated: "The illustration in Delile (1814) looks very similar to *S. aegyptius*. I have seen one specimen named *S. belbeysius*, of a discoid plant with small round capitula and glabrous achenes. The leaves are not unlike those of *S. aegyptius*, but are narrower and less divided". He added: "It is possible that hybridisation is taking place between *S. aegyptius* and *S. vulgaris* as long as both are tetraploid."

6. *Senecio hoggariensis* Batt. & Trab., Bull. Soc. Bot. France 58: 671 (1911).

Like *Senecio glaucus* subsp. *coronopifolius*, but leaves more broadly and closely lobed; capitula narrowly cylindrical; phyllaries 6-8 mm; ray limbs 8-10, 4-5.5 x 1-1.5 mm, pale purple; achenes 3-3.5 x 0.4 mm.

GE, S; sandy and stony wadis. Algeria (Hoggar), Chad (Tibesti), Egypt, Saudi Arabia.

#### 74. *Calendula* L.

Literature: Heyn, C. C., Dagan, O. & Nachman, B. 1974. The annual *Calendula* species: taxonomy and relationships. Israel J. Botany 23: 169-201.

Annuals, herbaceous perennials or subshrubs, often glandular and aromatic; leaves alternate, sessile, entire, toothed or shallowly lobed; capitula mostly solitary, pedunculate, radiate; involucre campanulate or hemispherical; phyllaries 1-2-seriate; receptacle flat, epaleate; ray florets female, fertile, yellow or orange; achenes polymorphic: the outer cymbiform, slightly curved, rostrate or triquetrous, the inner distinctly curved, sometimes winged, often annular (larva-shaped); all dorsally rugose to tuberculate; disc florets functionally male, yellowish-red or brownish; style undivided, with a conical acute tip surrounded by a ring of short hairs. About 12 species, Macaronesia, North Africa, Central and southern Europe, southwest Asia.

1. Achenes to 1.8 cm, beaked achenes usually present,  
winged achenes lacinate at the back

1. *C. arvensis*

+ Achenes to 1 cm, beaked achenes absent, at least a few outer achenes  
± smooth at the back and broadly 3-winged

2. *C. tripterocarpa*

1. *Calendula arvensis* L., Sp. Pl., ed. 2, 1303 (1763).

Syns. *Calendula aegyptiaca* Pers., Syn. Pl. 2: 492 (1807).

*Calendula bicolor* Raf., Caratteri 82 (1810).

*Calendula persica* C. A. Mey., Verz. Pfl. Cauc. 72 (1831).

*Calendula cristagalli* Viv., Fl. Libyc. Spec. 59, t. 26, f. 2 (1824).

*Calendula ceratosperma* Viv., Fl. Libyc. Spec. 59, t. 10, f. 2 (1824).

*Calendula gracilis* DC., Prodr. 6: 453 (1838).

*Calendula micrantha* Boiss., Diagn. Pl. Orient., ser. 2, 6: 111 (1859), non  
Tin. & Guss. in Guss., Fl. Sic. Syn. 2: 874 (1845).

Arachnoid glandular-hairy annual, 5-30(40) cm; stems many, much-branched, erect, ascending or decumbent, sulcate; leaves 2.5-8(12) x 0.5-2(3.5) cm, oblong-lanceolate, sessile, entire or denticulate, apiculate; lower leaves attenuate to the base, the cauline amplexicaul; capitula 1.2-2.5 diam. at anthesis, terminal; phyllaries 3-8 x 1-2 mm,

linear-lanceolate, subacute; ray florets 4-9 x 1.5-2.5 mm, ray limbs 7-9 x 2 mm, orange-yellow; disc florets 3-4 x 1-1.5 mm; achenes polymorphic: all annulate, or only the inner annulate, the marginal beaked and cymbiform (boat-like), the annulate 2-3.5 mm diam., variably rugose dorsally; beaked achenes 0.8-1.8 cm, variably incurved, rugose to spinose, or laciniate-winged at the back; cymbiform achenes 6-8 mm, inflated, rugose dorsally.

N, O, M, D, R, S; desert wadis, alluvial and sandy plains, cultivated ground, orchards, roadsides, waste ground. Mediterranean region, eastwards to Pakistan, Afghanistan and India, introduced to many temperate regions.

NOTE: *Calendula arvensis* is a polymorphic widespread species, known from diverse habitat types in Egypt, ranging from weeds to desert annuals. Several species have been described of these variants by some authors; e.g. Täckholm (1974) listed besides *C. arvensis*, three other species: *C. aegyptiaca*, *C. micrantha* and *C. bicolor*, treated here as synonyms of *Calendula arvensis*.

2. ***Calendula tripterocarpa*** Rupr., Bull. Phys.-Math. Acad. Pétersb. 14: 231 (1856).  
Syn. *Calendula platycarpa* Coss., Bull. Soc. Bot. France 3: 703 (1856), nom. nud.

Like *Calendula arvensis*, but 5-15(25) cm; achenes to 1 cm; beaked achenes absent; at least a few marginal achenes  $\pm$  smooth at the back and broadly 3-winged; restricted to desert habitat types.

De, S; sandy desert wadis. Egypt, Palestine, Syria, Arabia, Iraq.

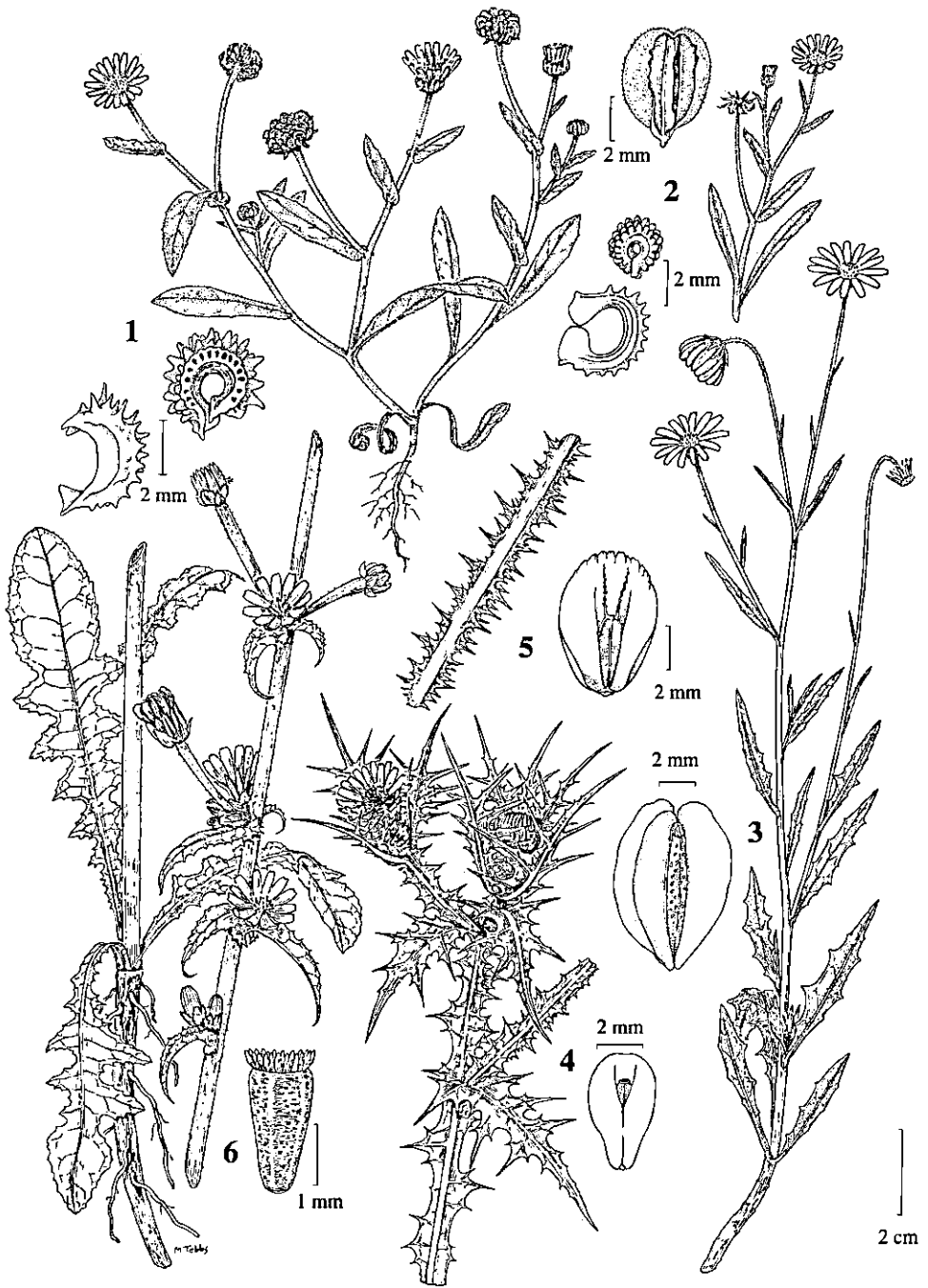
NOTE: Täckholm (1974), and likewise some other authors, gave no mention of the occurrence of *Calendula tripterocarpa* in their accounts of the genus *Calendula* in Egypt. However, Boulos (1995) listed *C. tripterocarpa*, as unconfirmed, in the Eastern Desert and Sinai. In the course of our work on this account, we came across several specimens of *Calendula tripterisperma* (K!) collected in Egypt, previously identified as the closely allied polymorphic *Calendula arvensis*.

### 75. ***Osteospermum*** L.

Annuals, herbaceous perennials or shrubs; leaves alternate or sometimes opposite, entire or variously lobed; capitula radiate; involucre campanulate or hemispherical; phyllaries 1-3-seriate; ray florets female, fertile, yellow or orange-yellow; disc florets functionally male; style bifid, with an apical ring of hairs; achenes homomorphic or heteromorphic, straight or slightly curved, triquetrous and 3-winged, terete and smooth, ribbed or tuberculate. About 45 species, South and tropical Africa, St Helena, Somalia, Arabia, Egypt, Palestine.

1. ***Osteospermum vaillantii*** (Decne.) Norl., Stud. Calend. 1: 305 (1943).  
Syn. *Tripteris vaillantii* Decne., Ann. Sci. Nat. Bot., sér. 2, 2: 260 (1834).

Scabrous herbaceous perennial, rarely annual, 20-50 cm; stems usually branched from the base, erect, sulcate; leaves 2-8 x 0.4-1.8 cm, oblong-lanceolate to narrowly lanceolate, remotely dentate; lower leaves opposite, attenuate to a winged petiole, the cauline alternate, the upper smaller, sessile,  $\pm$  entire; peduncle 1.5-8(15) cm, bracteate;



**Plate 65. COMPOSITAE:** *Calendula arvensis* 1, habit; two types of achenes (down left). *Calendula tripterocarpa* 2, flowering branch; marginal winged achene (up left); inner achenes (down left). *Osteospermum vaillantii* 3, habit; achene (middle left). *Scolymus maculatus* 4, flowering branch; achene (down right). *Scolymus hispanicus* 5, part of the stem; achene (right). *Cichorium erdivia* subsp. *divaricatum* 6, flowering branch; basal leaves and root (left); achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

capitula in lax corymbose inflorescences, radiate, nodding after anthesis; phyllaries 1-seriate, 4-5 x 1 mm, linear-lanceolate, the midrib green and scabrous, the margin scariosus, the apex acute; ray florets 1.2-1.5 cm, female, fertile; rays c. 8 x 2-2.5 mm, yellow; disc florets 4-5.5 mm, functionally male; achenes 0.8-1.1 x 0.6-0.8 cm including the wings; wings 2.5-3.5 mm broad, membranous, exceeding the central tuberculate seed-bearing part.

De, GE, S; stony wadis and hillsides. Egypt, Palestine, Arabia, Socotra, Sudan, Ethiopia, Eritrea, Djibouti, Somalia, Kenya, Uganda, Tanzania.

NOTE: Both annual and perennial variants of this species are known in Egypt.

**76. Scolymus L.**  
Syn. *Myscolus* Cass.

Spiny herbaceous annuals, biennials or perennials; stems spiny-winged; leaves pinnatifid to pinnatisect, decurrent, rigid, spiny; capitula sessile, axillary and terminal; receptacle paleate; paleae broadly winged, deciduous together with the firmly enclosed achenes; florets yellow; achenes dorsally flattened, glabrous; pappus of few coarse scabrid bristles, or absent. 3 species, Northwest France, Mediterranean region, eastwards to Iran, Caucasus.

- 1. Wings on stems uninterrupted; leaves and wings with a thick white vein along the margin; florets lemon-yellow, with long dark hairs outside; pappus absent **1. S. maculatus**
- + Wings on stems interrupted; leaves and wings without a white vein along the margin; florets orange-yellow, with white hairs outside; pappus of 2-4 barbellate bristles **2. S. hispanicus**

1. **Scolymus maculatus** L., Sp. Pl., ed. 1, 813 (1753).

Spiny glabrous annual 0.3-1.2 m; stems erect, stout, branched above, sulcate, whitish, conspicuously winged; wings uninterrupted, with deltoid spine-tipped lobes; leaves variable: the basal 6-15 x 2-4.5 cm, oblanceolate in outline, pinnatifid, spinose-dentate, tapering to a winged petiole; cauline leaves 2-6 x 2-4 cm, thick, rigid, oblong-deltoid, decurrent, coarsely spinose, with a thick white vein along the margins; capitula sessile, few, in a corymbose inflorescence; involucre c. 1.5 x 0.8 cm, ovoid, glabrous; outer phyllaries 4-5, 2-3 x 1 cm, pectinate-spinose, ± spreading; inner 0.4-1.5 x 0.3-0.4 cm, oblong-ovate, scariosus-margined, spine-tipped; florets lemon-yellow, thinly covered with long dark hairs outside; corolla-tube 5-6 mm; ray c. 9 x 2 mm; achenes 4-5 x 3 mm, ± flattened, oblong-ovate, enveloped by the folded adnate paleae, winged all round; pappus absent.

N, O; edges of cultivation, waste ground, roadsides. Mediterranean region, southern Europe.

2. **Scolymus hispanicus** L., Sp. Pl., ed. 1, 813 (1753).

Like *Scolymus maculatus*, but biennial or perennial; wings on the stems interrupted; leaves and wings without a white vein along the margins; florets orange-yellow, with white hairs outside; pappus present, of 2-4 barbellate bristles.

O, M; edges of cultivation, waste ground, roadsides. Canary Islands, Mediterranean region, southern Europe, extending to northwest France.

## 77. *Cichorium* L.

Literature: Kiers, A.M. 2000. Endive, Chicory, and their wild relatives. A systematic and phylogenetic study of *Cichorium* (Asteraceae). *Gorteria* Suppl. 5: 1-77.

Annuals, biennials or herbaceous perennials; leaves dentate to runcinate-pinnatifid or pinnatisect; capitula in elongate spicate inflorescences, solitary or in clusters, in the axils of the branches; phyllaries 2-seriate, the outer short and forming a calyculus; florets blue, rarely pink or white; receptacle  $\pm$  flattened, naked or nearly so; achenes obovoid, 3-5-angled, glabrous; pappus of minute 1-3-seriate scales. About 6 species, Europe, Mediterranean region, southwest Asia, northeast Africa to Ethiopia.

### 1. *Cichorium endivia* L., Sp. Pl., ed. 1, 813 (1753) subsp. *divaricatum* (Schousb.)

P.D. Sell, Bot. J. Linn. Soc. 71: 240 (1976).

Syns. *Cichorium pumilum* Jacq., Obs. Bot. 4: 3 (1771).

*Cichorium divaricatum* Schousb., Vextriget Marokko 199-200 (1800).

*Cichorium ambiguum* Schult., Obs. Bot. 170 (1809).

*Cichorium glaucum* Hoffmans. & Link, Fl. Port. 2: 178 (1809).

*Cichorium minimum* Port., Enum. Pl. Dalm. 16 (1824).

*Cichorium intybus* L. var. *divaricatum* (Schousb.) DC., Prodr. 7: 84 (1838).

*Cichorium endivia* L. var. *pumilum* (Jacq.) Vis., Fl. Dalmat. 2: 97 (1847).

*Cichorium glandulosum* Boiss. & Heut. in Boiss., Diagn. Pl. Orient., ser. 2, 3: 87 (1856).

*Cichorium calvum* Sch. Bip. ex Asch. in Schweinf., Beitr. Fl. Aethiop. 143 (1867).

*Cichorium noeanum* Boiss., Fl. Orient. 3: 717 (1867).

*Cichorium polystachyum* Pömel, Nouv. Fl. Atlant. 18 (1874).

*Cichorium intybus* L. subsp. *pumilum* (Jacq.) Ball, J. Linn. Soc. 16: 534 (1878).

*Cichorium endivia* L. subsp. *pumilum* (Jacq.) Cout., Fl. Port. 662 (1913).

Sparsely scabrid, otherwise glabrous annual, 10-80 cm; stems erect or spreading, much-branched, sulcate; basal leaves 6-15(25) x 2.5-6 cm, oblong or oblanceolate, dentate or runcinate-pinnatifid to pinnatisect, tapering to a short winged petiole, the margins coarsely dentate or denticulate; cauline leaves much smaller, entire or denticulate, clasping, auriculate; capitula sessile or pedunculate, 1- to several in the axils of cauline leaves, or terminal; peduncle indurate in fruit; involucre 0.8-1.2 x 0.6-0.8 cm, campanulate; outer phyllaries 0.8-1.2 x 0.4-0.5 cm, ovate-elliptic, the margins ciliate, with cilia to 1.5 mm, the apex acute or spinulose; inner phyllaries 1-1.2 x 0.2-0.3 cm, oblong, with scarious margin and obtuse to subacute apex; florets 0.8-1.2 x 0.3-0.4 cm, blue, the apex 5-dentate; achene c. 2 x 1.2 mm, obconical, 5-angled, ribbed, finely verrucose-papillose, the apex truncate; pappus c. 1 mm, of whitish laciniate scales.

M, O, M; weed of cultivation, moist ground. Canary Islands, Europe, Mediterranean region, southwest Asia, introduced elsewhere.

NOTE: *Cichorium endivia* is polymorphic, and is treated by some authors as a species complex. However, in this treatment we only recognize two taxa: subsp. *endivia*, the

cultivated endive, and subsp. *divaricatum*, the wild chicory. On the other hand, in the recent study of Kiers (2000), three species are recognized within this complex: *C. endivia*, *C. pumilum* and *C. calvatum*. In her notes, p. 69, she wrote: "*C. calvatum* resembles *C. endivia* and to a lesser extent *C. pumilum*, but differs clearly by the apparent absence of pappus scales, the shortly obconical achenes, and the width of the outer phyllaries." She gave some minor differences, which we consider as expected variations within a species of numerous populations and occupying a wide range of distribution within diverse habitat types. The wild chicory, subsp. *divaricatum*, is widely used as a green salad in rural Egypt, especially in the Nile delta, and is often cultivated for its use as an appetizer and in folk medicine.

## 78. *Hyoseris* L.

Annuals or herbaceous stemless perennials; leaves in rosettes, regularly lobed; capitula solitary, on leafless scapes; involucre cylindrical-campanulate; phyllaries 2-seriate, the outer short, the inner much longer, accrescent in fruit; receptacle flat; florets yellow, often purple striped dorsally; anthers sagittate at base; style-branches slender, with very short hairs; achenes variable: the marginal slightly compressed, the median flattened, winged, the inner cylindrical; pappus mostly 2-seriate, the outer of short slender scabrid hairs, the inner of long, coarse, basally flattened, scale-like, scabrid bristles. 5 species, Europe, Mediterranean region.

1. Annual; scapes 1-7 cm, swollen in fruit; involucre 7-9 x 3-5 mm  
+ Perennial; scapes 8-20 cm, not swollen in fruit;  
involucre 1.2-1.5 x 1-1.4 cm

2. *H. scabra*

1. *H. radiata* subsp. *graeca*

1. *Hyoseris radiata* L., Sp. Pl., ed. 1, 808 (1753) subsp. *graeca* Halácsy, Consp. Fl. Graec. 2: 179 (1902).  
Syn. *Hyoseris lucida* L., Mant. 103 (1767).

Perennial stemless herb; leaves 4-18 x 1-3.5 cm, oblanceolate in outline, pinnatisect, petiolate, fleshy, glabrous; lobes 0.3-1.2 x 0.3-1 cm, broadly ovate to almost orbicular, entire or slightly dentate, runcinate, often overlapping, the apex acute; scapes 8-20 cm, erect, often curved, glabrous, slightly flattened, not swollen in fruit; involucre 1.2-1.5 x 1-1.4 cm, cylindrical-campanulate, glabrous; outer phyllaries 2-5 x 2-2.5 mm, ovate-lanceolate, the apex subacute; inner phyllaries 1.2-1.5 x 0.25-0.35 cm, narrowly scarious-margined, the apex obtuse; florets 1.2-1.5 cm, yellow; achenes 0.8-1.1 cm, brown, of 3 types: the marginal *c.* 2 mm broad, compressed; the median *c.* 3 mm broad, compressed and winged, the margins spinulose; the inner *c.* 1 mm broad, terete; pappus 5-9 mm, yellowish-brown, of rigid scabrid hairs and linear scales, pappus of the outer sometimes much shorter than that of the median and inner achenes.

M; maritime oolitic sand dunes, rather widespread. Mediterranean region.

2. *Hyoseris scabra* L., Sp. Pl., ed. 1, 809 (1753).

Like *Hyoseris radiata* subsp. *graeca*, but a dwarf annual; scapes 1-7 cm, swollen in fruit; involucre 7-9 x 3-5 mm.

M; coastal sands. Mediterranean region.

NOTE: *Hyoseris scabra* is rare in Egypt, while *H. radiata* subsp. *graeca* is rather widespread in the Mediterranean coastal region.

### 79. *Hedypnois* Mill.

Annuals; leaves alternate or in a basal rosette, entire to dentate-pinnatifid; capitula solitary, homogamous, many-flowered, terminal and axillary, on stout, rather long peduncles; involucre subcylindrical or campanulate; phyllaries 2-seriate, the outer small, the inner much larger, boat-shaped, accrescent and thickened in fruit, enveloping the marginal achenes; florets yellow, sometimes reddish- or greenish-striped dorsally; style-branches long, with very short hairs; receptacle flat, naked; achenes narrowly cylindrical, incurved, ribbed, minutely scabrid, the outer partly enclosed by the persistent phyllaries; pappus dimorphic, in outer florets a small corona, in inner florets of a few free coarse scale-like bristles. 2 species, Macaronesia, Mediterranean region, eastwards to Iran, 1 widely distributed weed.

#### 1. *Hedypnois rhagadioloides* (L.) F. W. Schmidt, Samml. Phys. Ökon. Aufs. 1: 279. (1795).

Syns. *Hyoseris rhagadioloides* L., Sp. Pl., ed. 1, 809 (1753).

*Hyoseris cretica* L., Sp. Pl., ed. 1, 810 (1753).

*Hyoseris hedypnois* L., Sp. Pl., ed. 1, 809 (1753).

*Hedypnois globulifera* Lam., Fl. Fr., ed. 2, 2: 107 (1778).

*Hedypnois cretica* (L.) Dum. Cours., Le Botaniste Cultivateur 2: 339 (1802).

*Hedypnois monspeliensis* Willd., Sp. Pl., ed. 4, 1616 (1803).

*Hedypnois pendula* Willd., Sp. Pl., ed. 4, 1618 (1803).

*Hedypnois coronopifolia* Ten., Cat. Hort. Neap. 60 (1819).

*Hedypnois tubiformis* Ten., Fl. Neapol. 2: 173, t. 73 (1820).

*Hedypnois crepidiformis* Rchb., Fl. Germ. Excurs. 250 (1831).

*Hedypnois polymorpha* DC., Prodr. 7: 81 (1838), nom. illeg.

*Hedypnois sabulorum* Pomel, Nouv. Mat. Fl. Atlant. 1: 17 (1874).

Hispid annual 5-40 cm; stems branched, erect or diffuse; leaves 3-8 x 0.3-1.5 cm, oblong-ob lanceolate, entire, sinuate-dentate or pinnatifid, the basal attenuate to a winged petiole, the cauline smaller, sessile, clasping; peduncle 2-8(12) cm, hollow, slightly to strongly swollen in fruit; capitulum 6-9 x 4-5 mm, subcylindrical at anthesis, 1-1.5 cm diam., hemispherical in fruit; phyllaries 2-seriate, the outer few, 2-4 x 1 mm, subulate, hispid; inner 6-9 x 1.5 mm, narrowly lanceolate, acute, hispid; florets 5-7 mm, yellow; achenes polymorphic: the marginal 5-7 x 1 mm, curved, enveloped by the accrescent and thickened boat-shaped phyllaries, pappus c. 1 mm of a corona; inner achenes 5-7 x 1 mm, less curved, pappus 4-5 mm, of 5 subulate scales.

M, D, S; sandy soils, waste ground, roadsides. Mediterranean region, Sinai, eastwards to Iran.

NOTE: *Hedypnois rhagadioloides* is a variable species which some authors classify as an aggregate of taxa. Feinbrun-Dothan, Fl. Palaest. 3: 413-414 (1978), enumerated subsp. *rhagadioloides* and subsp. *tubaeformis* (Ten.) Hayek, based on the shape of the fruiting peduncle: slightly swollen in subsp. *rhagadioloides* and strongly swollen in subsp. *tubaeformis*. In this account *Hedypnois rhagadioloides* is treated as a single taxon.



## 80. *Garhadiolus* Jaub. & Spach

Annuals; leaves mostly rosulate, entire, dentate-pinnatifid or lobed; capitula in rather stout cymose inflorescences; phyllaries 2-seriate, the outer minute, forming a calyculus; the inner accrescent in fruit; florets yellow; style-branches long, with very short hairs; achenes terete, incurved, the marginal partly enclosed by the persistent phyllaries with a pappus of minute hairs; inner achenes beaked, with a pappus of a few scabrid bristles. 4 species, southwest Asia to China.

1. *Garhadiolus angulosus* Jaub. & Spach, Ill. Pl. Orient. 3: 122, t. 285 (1850).

Syns. *Garhadiolus hedypnois* (Fisch. & C. A. Mey.) Jaub. & Spach. Ill. Pl.

Orient. 3: 120, t. 284 (1850), nom. illeg.

*Rhagadiolus hedypnois* Fisch. & C. A. Mey., Ind. Sem. Hort. Petrop. 4: 46 (1838).

*Rhagadiolus angulosus* (Jaub. & Spach) Kupicha, Notes Roy. Bot. Gard. Edinb. 33: 433 (1975).

Sparsely setulose annual 5-25 cm; stems branched from the base; leaves 2-10 x 0.5-2.5 cm, oblanceolate, coarsely sinuate-dentate to pinnatifid; lobes deltoid, acute; basal and lower cauline leaves tapering to a winged petiole; upper leaves smaller, sessile; peduncle 0-2 cm, indurate in fruit; capitula in cymose rigid leafless inflorescences; flowering capitula 3-4 x 2 mm; fruiting capitula 7-9 x 5-7 mm; involucre cylindrical-campanulate, connivent in fruit; phyllaries 2-seriate, the outer of a minute calyculus and soon deciduous; inner phyllaries 3-4 x 0.5 mm, oblong-linear, narrowly scarious-margined, in fruit 7-9 x 1 mm, with a thick base and acute apex, slightly curved, indurate, thickened and persistent; florets c. 3 mm, yellow; achenes c. 1 x 0.1 cm, terete, incurved; marginal achenes partly enclosed by the persistent phyllaries, with a pappus of minute hairs; inner achenes hirtellous.

M; sandy soils. Egypt, Palestine, Lebanon, Syria, Iraq, Arabia, eastern Turkey, Iran.

## 81. *Koelpinia* Pall.

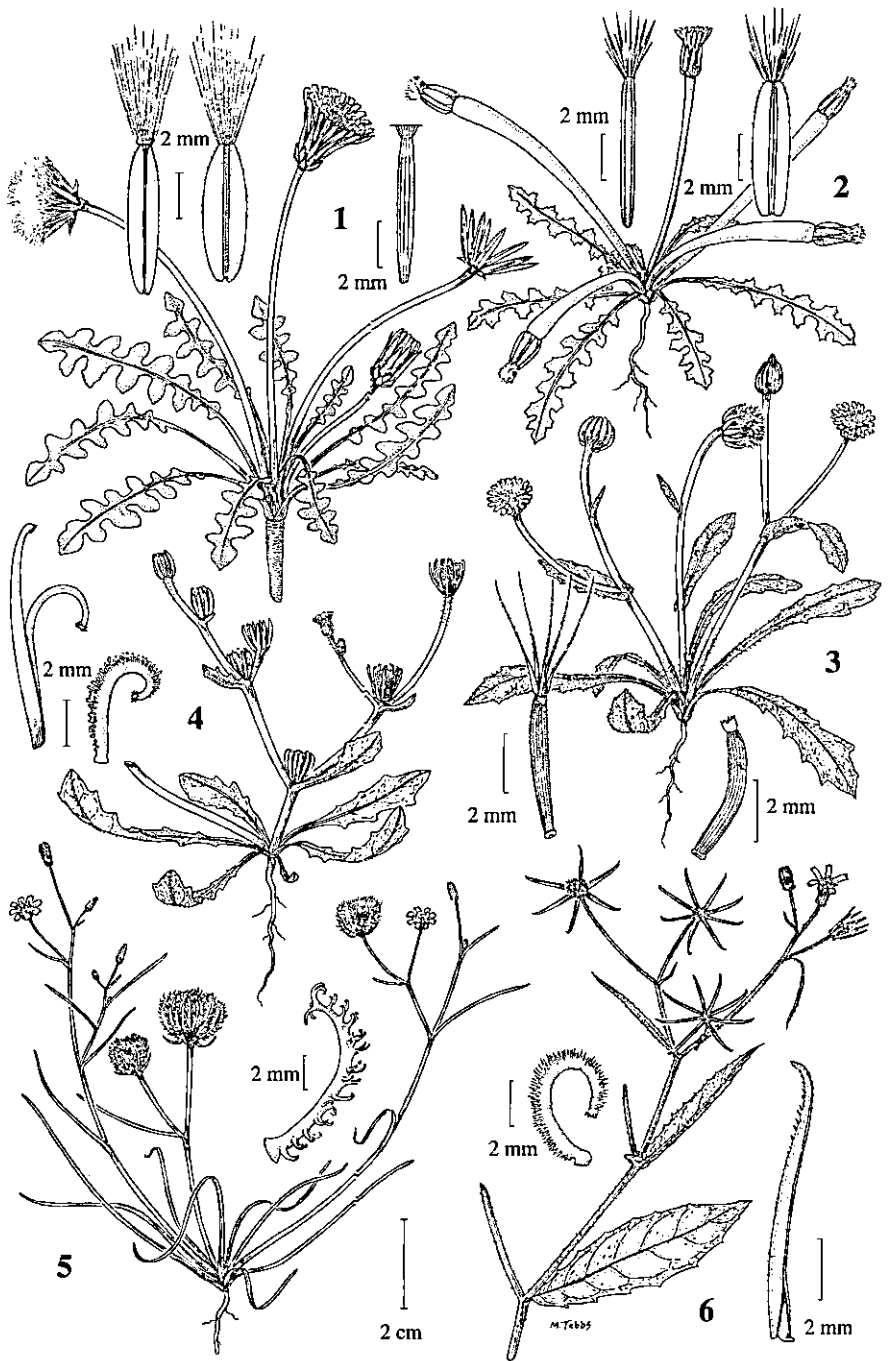
Annuals; leaves linear to filiform, entire; capitula solitary or laxly corymbose; phyllaries 2-seriate, the outer very small, forming a calyculus; inner phyllaries longer, not accrescent in fruit; receptacle naked or with a few bristles; florets yellow; style-branches short; achenes stellately spreading, slender, terete, strongly incurved, dorsally and apically with hooked projections, glandular, persistent; pappus absent. 5 species, southeast Russia, Spain, North Africa, southwest Asia to Afghanistan, India, Central Asia.

1. *Koelpinia linearis* Pall., Reise 3: 755 (1776).

Syns. *Lapsana koelpinia* L.f., Suppl. Plant. 348 (1781).

*Rhagadiolus koelpinia* (L.f.) Willd., Sp. Pl., ed. 4, 3: 1626 (1803).

Sparsely pubescent annual 10-30 cm; stems usually much-branched, erect or diffuse, terete, sulcate; leaves 3-12 x 0.1-0.25 cm, narrowly linear, grass-like, 3-nerved, acute, sessile, clasping, the basal longer than the cauline; peduncle 0.5-3.5 cm, ebracteate; capitula often solitary at the base, and in lax terminal and lateral cymes; involucre 5.5-7 x 2-3.5 mm in flower, cylindrical; phyllaries 2-seriate, the outer 1-2 x 0.5 mm, narrowly lanceolate, apex subacute, the inner 5.5-7 x 0.5 mm, linear-lanceolate, subacute; florets 5-6 mm, yellow; achenes 1-1.2 x 0.1-0.15 cm, strongly incurved, ribbed, with many



**Plate 66.** COMPOSITAE: *Hyoseris radiata* subsp. *graeca* 1, habit; marginal achene (up left); median achene (up within); inner achene (up right). *Hyoseris scabra* 2, habit; marginal achene (up right); inner achene (up within). *Hedypnois thagadioloides* 3, habit; marginal achene (down right); inner achene (down left). *Garhadiolus angulosus* 4, habit; inner achene (left); marginal achene, partly enclosed by the persistent phyllary (further left). *Koelipinia linearis* 5, habit; achene (within). *Thagadiolus stellatus* 6, flowering and fruiting branch; marginal achene, enclosed by the persistent phyllary (right); inner achene (left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbis.

hooked spinules mainly on the dorsal side, the apex with a radiating crown of unequal spinules.

M, De, S; sandy and calcareous soils, desert wadis. Southeast Russia, Spain, North Africa, southwest Asia to Afghanistan, India, Central Asia.

## 82. *Rhagadiolus* Juss., nom. conserv.

Literature: Meikle, R. D. 1979. *Rhagadiolus*: a misunderstood genus. Taxon 28: 133-141.

Annuals; stems branched; leaves mostly basal, subentire to dentate-pinnatifid; capitula small, sessile or short-pedunculate, in cymose inflorescences; involucre cylindrical; phyllaries 2-seriate, the outer minute, the inner longer, accrescent, persistent; florets yellow; style branches long, slender, with very short hairs; receptacle flat, naked; achenes narrowly terete to subulate, incurved, the outer enclosed by the persistent phyllaries, spreading and stellately arranged in fruit, the inner deciduous; pappus absent. 2 species, Mediterranean region, eastwards to Iran.

### 1. *Rhagadiolus stellatus* (L.) Gaertn., Fruct. Sem. Pl. 2: 354, t. 157, f. 2 (1791).

Syn. *Lapsana stellata* L., Sp. Pl., ed. 1, 811 (1753).

Sparsely strigose annual 10-40 cm; stems erect or diffuse, usually branched, terete, sulcate; leaves 3-12(18) x 0.5-3.5(5) cm, the basal usually rosulate, oblanceolate, subentire, coarsely dentate to pinnatisect, the lobes minutely denticulate and acute, the base attenuate to a short winged petiole; cauline leaves shorter, elliptic, sessile, subentire or dentate, the uppermost bractiform; peduncle 0.5-3 cm, ebracteate; capitula in lax paniculate inflorescences; involucre 5-7 x 3-4 mm, cylindrical; phyllaries 2-seriate; the outer 1-2 x 1 mm, ovate-cordate, the margins scarious, the apex acute; inner phyllaries 5-7 x 1 mm, linear-lanceolate, thickened and stellately spreading in fruit, narrowly scarious-margined, the apex obtuse; florets 6-8 mm, yellow; achenes dimorphic: the marginal 6-8, 1.2-1.5 x 0.1-0.25 cm, slender, subulate, attenuate to a long narrow neck, glabrous, enclosed by the persistent phyllaries; inner achenes 1-3, or none, 0.6-1.2 x 0.1 cm, arcuate, dorsally hispidulous; pappus absent.

M; edges of cultivation, waste ground. Mediterranean region, eastwards to Iran.

## 83. *Urospermum* Scop.

Annuals or herbaceous perennials, with coarse multicellular hairs; basal leaves in a rosette, the cauline alternate, entire or coarsely dentate-pinnatifid; capitula solitary at the ends of branches; phyllaries 1-seriate, connate at the base; florets pale yellow; style branches long, with very short hairs; achenes laterally flattened, transversely strongly rugose, beaked; beak long, oblique, hollow at the base, articulated at point of junction with the achene, and with a distinct apical disc; pappus of plumose, basally flared bristles, white, deciduous. 2 species, Mediterranean region, southwest Asia to Pakistan.

### 1. *Urospermum picroides* (L.) F. W. Schmidt, Samml. Phys.-Ökon. Aufs. 1: 275 (1795).

Syn. *Tragopogon picroides* L., Sp. Pl., ed. 1, 790 (1753).

Hispid annual 10-50 cm; stems erect, usually branched, sulcate; leaves 5-18 x 1.5-6 cm, lyrate-pinnatisect, irregularly dentate, the apex acute; basal leaves tapering to a winged

petiole, the cauline sessile, clasping, auriculate; peduncle 3-15 cm, ebracteate; involucre 1.5-1.8 x 1-1.5 cm, campanulate, hispid, rather fleshy; phyllaries c. 8, 1-seriate, 1.5-1.8 x 0.3-0.4 cm, lanceolate, connate at the base, the apex acute, the margins scarios, erect at anthesis, reflexed after the achenes shed; florets c. 2 cm, yellow; corolla-tube 6-8 mm, pilose towards the apex; ligule 1-1.2 x 0.2 cm, minutely 5-dentate; achenes 1.3-1.6 x 0.15 cm, including the beak, subcylindrical, slightly compressed, transversely rugose; beak c. 8 mm, scabridulous, conspicuously gibbous at the base; pappus 1-1.2 cm, of 1-seriate plumose white bristles.

N, O, M, D, GE, S; weed of cultivation, waste ground, roadsides. Eastern Mediterranean region, southwest Asia.

84. *Leontodon* L., nom. conserv.

Syns. *Thrinicia* Roth, *Microderis* DC., *Kalbfussia* Sch. Bip.

Stemless scapose annuals, or herbaceous perennials, with coarse multicellular hairs; leaves in a rosette, entire, dentate, or pinnatifid to pinnatisect; capitula solitary on leafless scapes or laxly corymbose; phyllaries 2-5-seriate, imbricate; receptacle epaleate; florets yellow or rarely orange-yellow; style-branches long, with very short hairs; achenes ellipsoid-fusiform or terete, ribbed, transversely rugulose or muricate, beaked or not; pappus of plumose, basally connate bristles, rarely reduced to short scales, a corona, or absent in marginal achenes. About 50 species, Europe, Mediterranean region, temperate Asia.

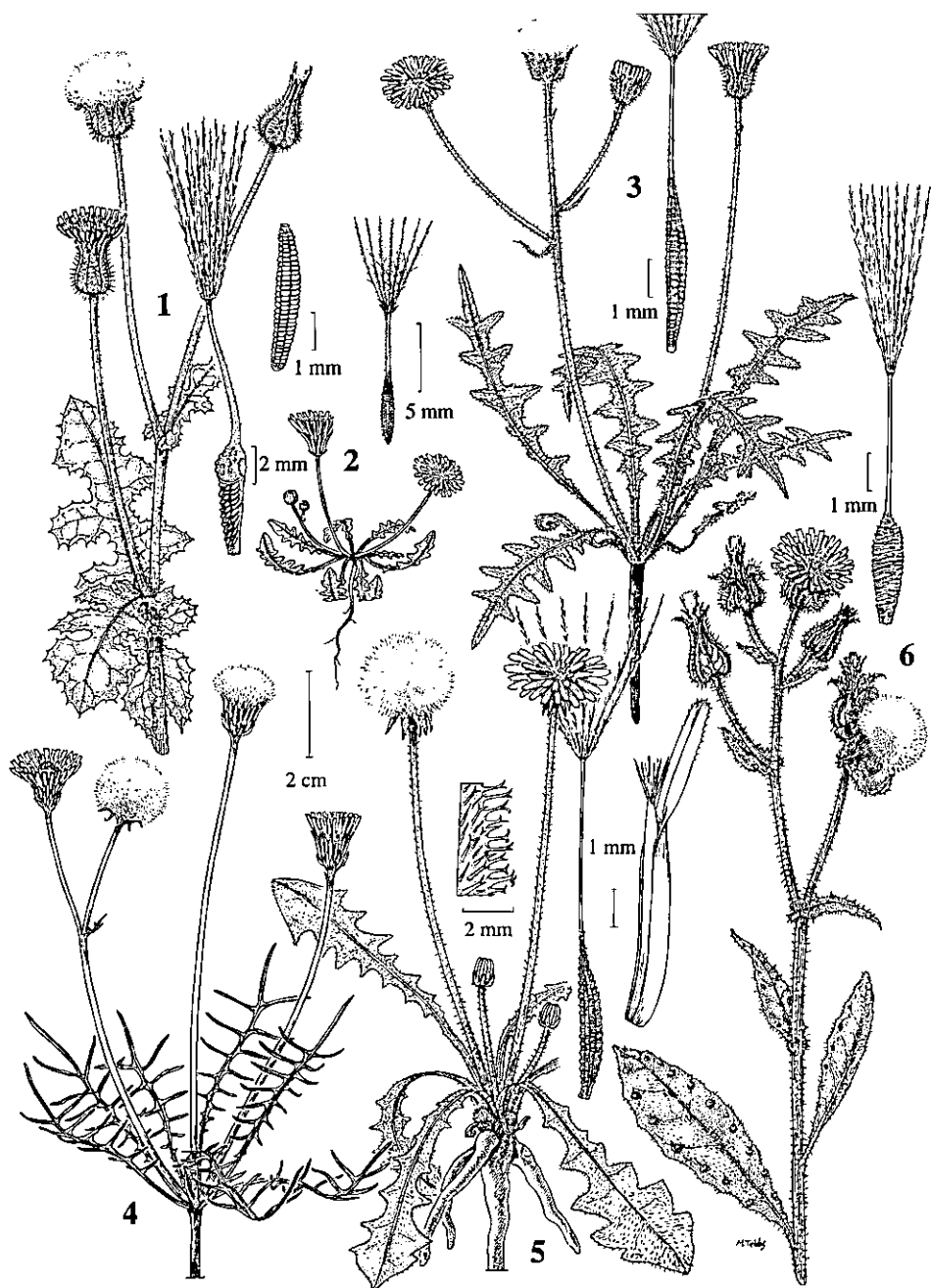
- |  |                         |
|--|-------------------------|
| 1. Perennial, with tuberous roots  | 4. <i>L. tuberosus</i>  |
| + Annual, with taproot   | 2                       |
| 2. Marginal achenes epappose, or with a short corona;<br>inner achenes pappose | 1. <i>L. simplex</i>    |
| + All achenes pappose  | 3                       |
| 3. Plant hispid; leaf-lobes 2-5 mm broad, oblong-linear or ovate-deltoid       | 2. <i>L. hispidulus</i> |
| + Plant ± glabrous; leaf-lobes 1-2 mm broad, mostly linear;                    |                         |
| phyllaries ± glabrous  | 3. <i>L. laciniatus</i> |

1. *Leontodon simplex* (Viv.) Widder, *Phyton* 12: 209 (1967).

Syn. *Hieracium simplex* Viv., *Fl. Libyc. Spec.* 50, t. 13, f. 4 (1824).

Stemless annual to 15(20) cm; taproot slender; leaves 1-5(8) x 0.5-1.5(2.5) cm, all in a basal rosette, oblanceolate, dentate, pinnatifid to pinnatipartite, tapering to a winged petiole, lobes deltoid to oblong-lanceolate, the margins setulose, the apex acute; capitula solitary, on simple or branched leafless scapes 4-10 cm; peduncle (on branched scapes) 2-6 cm, bracteate, the bracts minute; involucre 0.8-1 x 0.4-0.6 cm, campanulate; phyllaries 3-4-seriate, pubescent on the green midrib, the outer 2.5-4.5 x 1 mm, lanceolate, obtuse; inner phyllaries 0.8-1 x 0.15 cm, oblong-lanceolate, the margins scarios, the apex obtuse; corolla-tube 3-4 mm, pubescent; rays 0.9-1.1 cm, yellow; achenes dimorphic, all terete, strongly transversely muricate, brown, the marginal 3-4 x 0.5 mm, slightly curved, attenuate to a short beak, epappose, or of a short corona; inner achenes 6-7 x 0.5 mm, including a straight beak 3-3.5 mm; pappus 4-5 mm, 1-seriate, of plumose white bristles, often deciduous.

M; barley fields, edges of cultivation. North Africa.



**Plate 67. COMPOSITAE:** *Urospermum picroides* 1, flowering and fruiting branch; achene (right). *Leontodon simplex* 2, habit; marginal (epappose) and inner (pappose) achenes (up). *Leontodon hispidulus* 3, habit; achene (within). *Leontodon laciniatus* 4, habit. *Leontodon tuberosus* 5, habit; marginal achene (enclosed by the phyllary, beakless) and inner beaked achene (right); part of a leaf with simple and apically forked bristles (within). *Helminthotheca echioides* 6, flowering and fruiting branch; achene (up right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

NOTE: *Leontodon simplex* is restricted in Egypt to the area between Mersa Matruh and Sollum, where it is rather rare.

2. ***Leontodon hispidulus*** (Delile) Boiss., Fl. Orient. 3: 727 (1875).

Syns. *Crepis hispidula* Delile, Descr. Egypte, Hist. Nat. 117, t. 42, f. 1 (1814).

*Apargia annua* Vis., Pl. Aegypt. 38, t. 6 (1836).

*Oporinia hispidula* (Delile) DC., Prodr. 7: 109 (1838).

*Leontodon creticus* Boiss., Fl. Orient. 3: 728 (1875).

*Kalbfussia hispidula* (Delile) Bég. & Vacc., Ann. Bot. (Roma) 13: 33 (1914).

Stemless hispid annual 10-25 cm, with simple eglandular hairs; taproot rigid; leaves 3-10(15) x 1-3.5(5) cm, all in a basal rosette, oblong-ob lanceolate, attenuate to a winged petiole, pinnatifid to pinnatipartite; leaf-lobes 2-5 mm broad, oblong-linear or ovate-deltoid, subacute; capitula solitary, or simple or branched leafless scapes 5-30 cm; peduncle (on branched scapes) 3-9 cm, bracteate, the bracts minute; involucre 0.9-1.3 x 0.8-1 cm, campanulate; phyllaries 4-5-seriate, pubescent on the midribs, the outer 2-5 x 0.5-1 mm, lanceolate, narrowly scarious-margined, the apex obtuse; inner phyllaries 0.9-1.3 x 0.1-0.15 cm, oblong-lanceolate, broadly scarious-margined, the apex obtuse; corolla-tube 3-4 mm, pubescent; ligule 1-1.2 cm, yellow; achenes 7-8 x 0.5 mm, including a beak 3-4 mm, the achene body strongly transversely muricate, brown; pappus 7-8 mm, 1-seriate, of c. 10 plumose white soft bristles.

N, M, D, S; edges of cultivation, sandy deserts. Southeast Spain, North Africa, southwest Asia.

NOTE: Syntypes of *Crepis hispidula* were collected in Egypt near Alexandria and Cairo by Husson and Delile.

3. ***Leontodon laciniatus*** (Bertol.) Widder in Bornm., Iter Pers.-Turc., Beih. Bot. Centr. 60 Abt. II: 217 (1939).

Syns. *Oporina laciniata* Betol., Misc. Bot. 2: 21 (1843).

*Leontodon hispidulus* (Delile) Boiss. var. *tenuiloba* Boiss., Fl. Orient. 3: 728 (1875).

Like *Leontodon hispidulus*, but plant  $\pm$  glabrous; leaves lacinate, all pinnatisect; leaf-lobes 1-2 mm broad, mostly linear phyllaries  $\pm$  glabrous.

D, S; sandy desert wadis and plains. Egypt, Palestine, Lebanon, Syria, Turkey, Iraq, Arabia, Iran.

NOTE: Some authors include *Leontodon laciniatus* as a variety of the closely allied *L. hispidulus* (see synonymy). The line drawing of *L. hispidulus* in Täckholm, Stud. Fl. Egypt, ed. 2, plate 214, p. 293 (1974), seems to be based on a specimen of *L. laciniatus* rather than *L. hispidulus*, which indicates the close similarity between these species. The achenes of both species are almost identical.

4. ***Leontodon tuberosus*** L., Sp. Pl., ed. 1, 799 (1753).

Syns. *Thrinicia tuberosa* (L.) DC. in Lam. & DC., Fl. Fr., ed. 3, 4: 52 (1805).

*Thrinicia tripolitana* Sch. Bip. ex Coss., Bull. Soc. Bot. France 22: 66 (1875).

Stemless perennial herb, with a short, densely ferrugineous pubescent rootstock and a fascicle of fusiform tuberous roots, sparsely hispid, with simple and apically forked short bristles; leaves 4-18 x 1-4 cm, all in a basal rosette, oblanceolate, runcinate-pinnatifid to pinnatipartite, the apex acute, the base attenuate to a winged petiole; capitula solitary, on unbranched leafless ebracteate scapes to 30 cm; involucre 1.5-1.8 x 1-1.2 cm, campanulate, white-hispid; phyllaries 3-4-seriate, imbricate, the outer 3-5 x 1.25 mm, lanceolate, obtuse; inner phyllaries 1.5-1.8 x 0.15-0.2 cm, oblong-lanceolate, scarious-margined, obtuse; florets golden-yellow; corolla-tube 6-7 mm, slender, pilose above; ligule 1-1.2 cm, 5-toothed; achenes dimorphic: the marginal 6-7 x 0.5-1 mm, partly enclosed by the inner phyllaries, cylindrical-fusiform, transversely rugulose, tapering to a truncate apex, with a pappus *c.* 1 mm of yellowish scales; inner 8-9 x 0.75 mm, narrowly fusiform, slightly curved, ribbed, transversely rugose, tapering to a slender beak longer than the achene body, with a pappus 6-7 mm, of yellowish plumose bristles.

M; barley fields, sandy coastal soils, roadsides. Mediterranean region.

### 85. *Helminthotheca* Vaill. ex Zinn

Syns. *Helminthia* Juss., *Deckera* Sch.Bip., *Vigineixia* Pomel

Annuals or herbaceous perennials, with coarse multicellular apically 2-4-hooked hairs; basal leaves in a rosette, the cauline, alternate, entire or dentate-pinnatifid; capitula solitary in lax cymes; phyllaries 2-seriate, the outer foliaceous and ovate, the inner linear-lanceolate; florets yellow; style-branches long, with very short hairs; achenes obovoid-fusiform, transversely distinctly rugulose or muricate, beaked; beak fragile, sometimes absent in the outer florets; pappus of plumose, basally connate bristles, sometimes of short scales in marginal florets. 4 species, Europe, Mediterranean region, southwest Asia to Iran.

1. *Helminthotheca echioides* (L.) Holub, *Folia Geobot. Phytotax.* (Praha) 8: 176 (1973).

Syns. *Picris echioides* L., *Sp. Pl.*, ed. 1, 792 (1753).

*Helminthia echioides* (L.) Gaertn., *Fruct. Sem. Pl.* 2: 368, t. 159, f. 2 (1791).

Annual 20-60 cm, with rigid multicellular, often tubercle-based, apically 2-4-hooked hairs; stems erect or decumbent, branched; leaves 2-10 x 0.5-2.5 cm, the basal oblanceolate, sinuate-dentate, narrowed to a winged petiole; cauline leaves gradually smaller, clasping, the uppermost lanceolate, sessile, amplexicaul; peduncle 0.5-5 cm; capitula in corymbose inflorescences; involucre 1-1.4 x 1-1.2 cm, campanulate, to 1.8 cm broad in fruit; phyllaries 2-seriate, the outer 3-5, 1-1.2 x 0.4-0.6 cm, cordate or broadly ovate, acuminate; inner phyllaries 1.2-1.4 x 0.2-0.3 cm, lanceolate, long-acuminate; florets *c.* 1.5 cm, yellow; corolla-tube *c.* 5 mm; ligule *c.* 1 cm; achenes 6-7 x 0.75 mm including the beak, the marginal slightly longer than the inner, the achene body 2.5-3 x 0.75 mm, obovoid-fusiform, transversely rugulose; beak *c.* 4 mm; pappus *c.* 6 mm, of plumose bristles, connate at the base.

N; weed of cultivation. Europe, Mediterranean region, southwest Asia, introduced elsewhere.

NOTE: The occurrence of this species in Egypt needs confirmation by acquiring new collections.

## 85. *Picris* L.

Literature: Lack, H. W. 1974. Die Gattung *Picris* L., sensu lato. Dissertationen Univ. Wien 116.

Lack, H. W. in Davis, P. H. *et al.* (eds) *Picris* L., Fl. Turkey 5: 678-684 (1975), edited by A. J. C. Grierson.

Annuals or herbaceous perennials, with rough multicellular, apically 2- to 4-hooked glochidiate bristles; leaves in a basal rosette, and alternate along the branched stems, entire or dentate-pinnatifid to pinnatisect, sometimes spinulose; capitula in cymose inflorescences, usually few; involucre urceolate-campanulate, multi-seriate, calyculate, usually constricted at the middle in fruit; inner phyllaries indurate at maturity and enclosing the marginal achenes; receptacle naked; florets yellow; style-branches long, with very short hairs; achenes ellipsoid-fusiform or terete, sometimes beaked or attenuate at the apex, 5-ribbed, often transversely rugulose or muriccate; pappus of plumose, basally connate bristles, rarely reduced to short scales or bristles in marginal achenes. About 40 species, Europe, Mediterranean region, African mountains, Asia, northern Australia.

- |   |                                  |
|---|----------------------------------|
| 1. Achenes long-beaked, the beak slightly shorter than the achene body;<br>ripe achenes metallic greyish-blue   | 2. <b><i>P. cyanocarpa</i></b>   |
| + Achenes short-beaked, the beak much shorter than the achene body, or achenes<br>beakless, or attenuate at apex; ripe achenes brownish or brownish-black | 2                                |
| 2. Achenes 6-6.5 mm; pappus persistent  | 4. <b><i>P. sulphurea</i></b>    |
| + Achenes 1.8-5 mm; pappus deciduous  | 3                                |
| 3. Inner achenes 4-5 mm, with beak <i>c.</i> 1/2 as long as the achene body   | 3. <b><i>P. longirostris</i></b> |
| + Inner achenes 1.8-3 mm, beakless, or short-attenuate at apex  | 4                                |
| 4. Leaves pinnatifid to pinnatisect; inner achenes<br>broadest above middle   | 1. <b><i>P. asplenioides</i></b> |
| + Leaves entire or sinuate-dentate; inner achenes broadest at middle  | 5. <b><i>P. altissima</i></b>    |

### 1. *Picris asplenioides* L., Sp. Pl., ed. 1, 793 (1753).

Syns. *Crepis radicata* Forssk., Fl. Aegypt.-Arab. 145 (1775).

*Leontodon coronopifolium* Desf., Fl. Atlant. 2: 229 (1799).

*Picris lyrata* Delile, Descr. Egypte, Hist. Nat. 259 (1814).

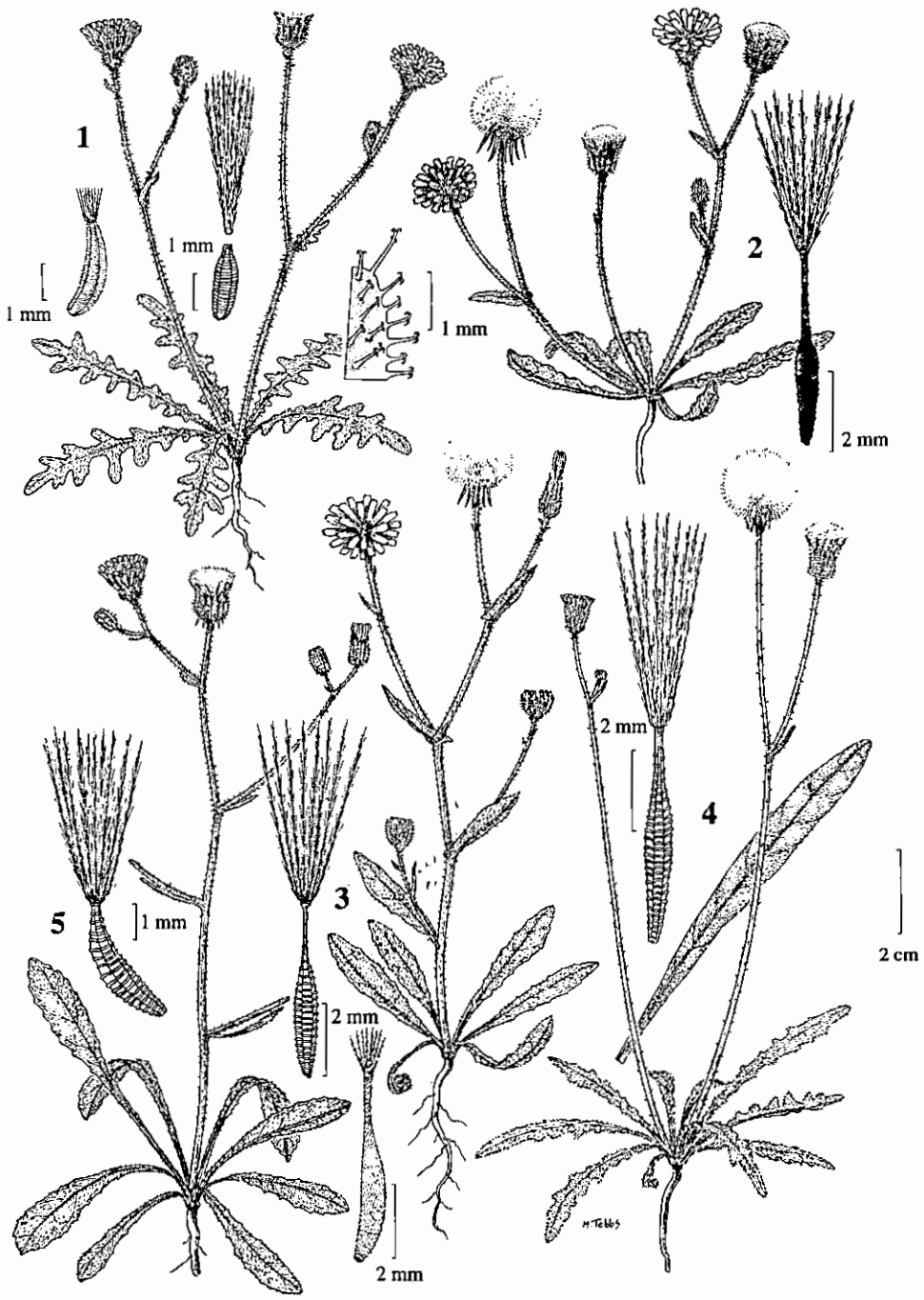
*Picris pilosa* Delile, Descr. Egypte, Hist. Nat. 260 (1814).

*Picris radicata* (Forssk.) Less., Syn. Gen. Comp. 134 (1832).

*Picris coronopifolia* (Desf.) DC., Prodr. 7: 131 (1838).

Hispid annual 3-30 cm, with a white tomentum of rough glochidiate bristles, 2-hooked at the apex, and shorter crisped hairs; stems erect or diffuse, branched from the base, sulcate; leaves 1.5-10(18) x 0.5-4.5(7) cm, oblong-lanceolate, mainly in a basal rosette, attenuate to a winged petiole, sinuate-pinnatifid to pinnatisect; lobes oblong-linear to deltoid-ovate, obtuse; cauline leaves much shorter, pinnatisect, clasping, the uppermost linear, entire; capitula solitary, in lax cymes; peduncle 2-10 cm, bracteate; involucre 7-9 x 5-6 mm, urceolate-campanulate, with white glochidiate bristles and fine crisped hairs; phyllaries 3-4-seriate, the outer 1.5-3 x 0.5-0.75 mm, lanceolate, acute; inner phyllaries 7-9 x 1-1.2 mm, oblong-lanceolate, obtuse, scarious-margined, indurate and keeled in the lower half in fruit; achenes dimorphic, all broadest above middle, marginal achenes 2-2.5 x 0.8-1 mm, ± terete, tapering towards the apex, striate, not rugose, pubescent, with a





**Plate 68.** COMPOSITAE: *Picris asplenoides* 1, habit; marginal achene left, inner achene (within); leaf surface showing glochidiate bristles (right). *Picris cyanocarpa* 2, habit; achene (right). *Picris longirostris* 3, habit; marginal achene (down left); inner achene (middle left). *Picris sulphurea* 4, habit and leaf variation; achene (within). *Picris altissima* 5, habit; outer achene (within). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

short pappus; inner achenes 1.8-2 x 0.8-1 mm, rugose, slightly attenuate at the apex, with a pappus c. 5 mm, of plumose bristles, deciduous.

N, M, D, S; desert wadis, sandy plains, edges of cultivation. North Africa, Sinai, Palestine, Arabia.

NOTE: The types of *Crepis radicata*, *Picris lyrata* and *Picris pilosa* were collected in Egypt.

2. ***Picris cyanocarpa*** Boiss., Diagn. Pl. Orient., ser. 1, 11:37 (1849).

Hispid annual 5-25 cm, with a white tomentum of crisped short hairs and longer glochidiate bristles; stems erect or ascending, branched; leaves 2-5.5 x 0.5-1.5 cm, mainly in a basal rosette, oblong-lanceolate, attenuate to a winged petiole, coarsely sinuate-dentate or shallowly pinnatifid; cauline leaves few, much smaller, linear-lanceolate, subentire, sessile, clasping; capitula solitary, in lax cymes; peduncle 2-8(12) cm, usually bracteate; involucre 0.8-1.1 x 0.6-0.8 cm, urceolate-campanulate, with white glochidiate bristles and crisped hairs; phyllaries 3-4-seriate, the outer few, 1.5-2.5 x 0.75 mm, lanceolate, subacute; inner phyllaries 0.8-1.1 x 0.1-0.15 cm, oblong-lanceolate, acute, scarious-margined, conspicuously indurate and keeled in fruit; achenes homomorphic, c. 5 x 0.6 mm including the beak, the achene body 2.5-3 x 0.6 mm, ellipsoid-fusiform, transversely rugulose; beak 2-2.5 mm; ripe achenes metallic greyish-blue; pappus 5-6 mm, of plumose bristles, connate at the base.

S; desert wadi beds. Sinai, Palestine, Arabia.

3. ***Picris longirostris*** Sch.Bip., Mus. Senkenb. 3: 60 (1839).

Syns. *Picris damascena* Boiss. & Gaill. in Boiss., Fl. Orient. 3: 740 (1875).

*Picris blancheana* Boiss., Fl. Orient. 3: 741 (1875).

*Picris damascena* Boiss. & Gaill. var. *persistens* Eig, Pal. J. Bot., Jerusalem ser., 1:72 (1938).

*Picris damascena* Boiss. & Gaill. var. *diffusa* Eig, Pal. J. Bot., Jerusalem ser., 1: 73 (1938).

*Picris damascena* Boiss. & Gaill. var. *homocarpa* Eig, Pal. J. Bot., Jerusalem ser., 1: 73 (1938).

Hispid annual 10-30 cm, with white glochidiate bristles and short crisped hairs; stems usually branched, erect or ascending, conspicuously sulcate; leaves 2-10 x 0.5-3.5 cm, coarsely sinuate-dentate or subentire, the basal oblong-oblancheolate or -elliptic, tapering to a winged petiole; cauline leaves smaller, lanceolate, sessile, clasping; capitula solitary on unbranched stems, or in lax cymes; peduncle 2-10 cm, bracteate; involucre 0.8-1 x 0.6-0.8 cm, urceolate-campanulate, with glochidiate bristles and crisped hairs; phyllaries 3-4-seriate, the outer few, 2-3 x 0.5 mm, lanceolate, obtuse; inner phyllaries 0.8-1 x 0.15-0.2 cm, oblong-lanceolate, acuminate, scarious-margined, indurate and keeled in fruit; achenes dimorphic: the marginal 5-6 x 0.75 mm, terete, broadest at the base, gradually attenuate to the apex, appressed-pubescent, with a pappus 1-1.5 mm, of scabridulous bristles; inner achenes 4-5 x 0.75 mm including the beak, glabrous, rugulose, dark brown; beak c. 2 mm; pappus 5-6 mm, of plumose bristles connate at the base, deciduous.

S; desert wadis. Sinai, Palestine, Lebanon, Syria, Iraq, Arabia, Iran.

NOTE: *Picris longirostris* is a variable species. Feinbrun-Dothan, Fl. Palaest. 3: 419-420 (1978), listed three varieties (of *Picris damascena*) and comments: "this variability seems to appear sporadically". These varieties, and other taxa, are all listed here as synonyms.

4. ***Picris sulphurea*** Delile, Descr. Egypte, Hist. Nat. 114, t. 40, f. 2 (1814).  
Syn. *Deckera nilotica* Sch.Bip., Flora 17: 479 (1834).

Hispid annual 5-30 cm, with bulbous-based white glochidiate bristles, and short crisped hairs; stems erect or ascending, branched or unbranched, sulcate; leaves 1.5-8(12) x 0.3-2 cm, mainly in a basal rosette, oblong-lanceolate, pinnatifid, sinuate-dentate to subentire, attenuate to a winged petiole; cauline leaves few or none, if present much smaller, linear-lanceolate, entire, sessile, clasping; capitula solitary or in lax cymes; peduncle 2-15 cm, bracteate; involucre 8-9.5 x 5-6 mm, urceolate-campanulate, with glochidiate bristles and crisped hairs; phyllaries 3-4-seriate, the outer few, 2-3 x 1 mm, lanceolate; subacute, inner phyllaries 8-9.5 x 1-1.25 mm, linear-lanceolate, the margins scarious, the apex acute, slightly elongate, indurate and keeled in fruit, with keels conspicuously setulose; achenes 6-6.5 x 0.75 mm including the beak; beak 1-1.5 mm; achene body ellipsoid-fusiform, transversely rugulose, blackish-brown; pappus 6-7 mm, of plumose bristles connate at the base, persistent.

N, O, D, S; desert wadis sandy plains, edges of cultivation. Egypt, Saudi Arabia.

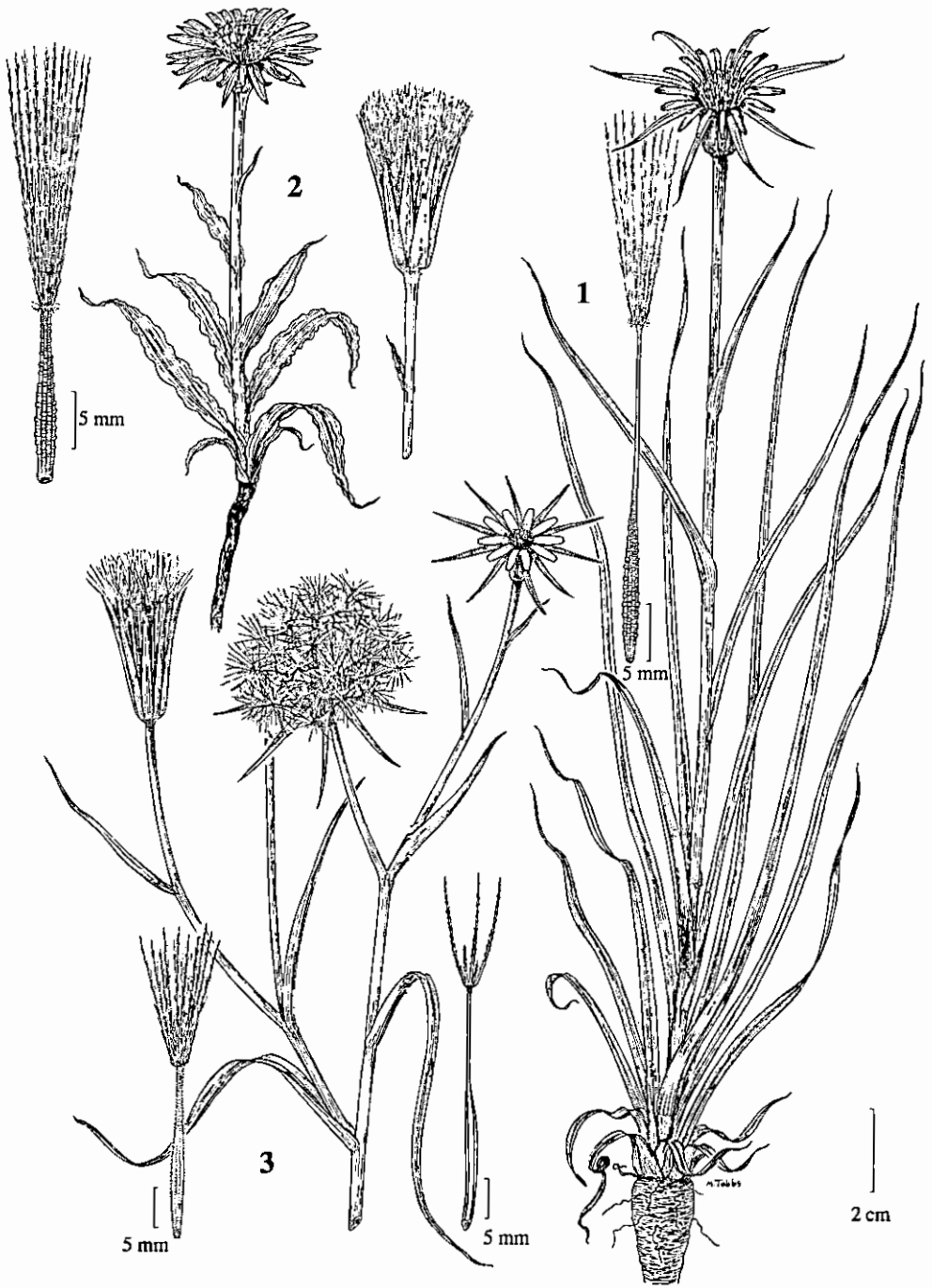
NOTE: The holotype of *Picris sulphurea* was collected near Old Cairo, "île de Gezyret et Dahab, près du vieux Kaire", Delile (MPU), fide Lack (1975).

5. ***Picris altissima*** Delile, Descr. Egypte, Hist. Nat. 260, t. 41, f. 2 (1814).  
Syns. *Hieracium sprengerianum* sensu auct. non L., Sp. Pl., ed. 1, 804 (1753).  
*Picris sprengeriana* (L.) Chaix in Vill., Hist. Pl. Dauph. 1: 369 (1786) quad  
comb. non typ.  
*Picris sprengeriana* (L.) Poir., Encycl. 5: 310 (1804).  
*Picris integrifolia* Desf., Tab. École Bot. 89 (1804), nom. nud.  
*Picris laxa* DC., Prodr. 7: 129 (1838).

Hispid annual 10-50 cm, with 2-, 3- or 4-hooked glochidiate bristles and short crisped hairs; stems erect, divaricately branched, sulcate; leaves 3-10 x 1.5-3.5 cm, the basal oblanceolate, attenuate to a winged petiole, remotely dentate or denticulate; cauline leaves smaller, subentire, sessile, clasping; capitula in lax cymes; peduncle 1-10 cm, bracteate; involucre 8-9 x 6-8 mm, urceolate-campanulate, with glochidiate bristles and crisped hairs; phyllaries 3-4-seriate, the outer 2.5-4 x 0.75 mm, lanceolate, acuminate; inner phyllaries 8-9 x 1 mm, linear-lanceolate, acuminate, the margins scarious, indurate and keeled in fruit, with keels conspicuously setulose; achenes heteromorphic, fusiform, attenuate towards the apex; outer achenes 3-4 x 1 mm, rugose, slightly curved, glabrous, blackish-brown, enfolded by the inner phyllaries, with a pappus 4.5-5.5 mm, of plumose bristles; inner achenes 2.5-3 x 0.8 mm, ± straight, finely rugose, glabrous, with a pappus 5-6.5 mm, of plumose bristles.

N, M, D, S; sandy desert soils, alluvial plains, cultivated ground, edges of cultivation, roadsides. Mediterranean region, Sinai.

NOTE: The type of *Picris altissima* was collected in Egypt "Iles sèches et sablonneuses du Nil", Delile (MPU), fide Lack (1975).



**Plate 69.** COMPOSITAE: *Tragopogon sinuatus* 1, habit; achene (within). *Tragopogon collinus* 2, habit; achene (left) fruiting capitulum (right). *Geropogon hybridus* 3, flowering and fruiting branch; marginal achene (down right); inner achene (down left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

*Imperfectly known species:*

*Picris strigosa* M. Bieb., Fl. Taur.-Caucas. 2: 250 (1808).

This species was reported by Täckholm (1974) from the Nile valley region of Egypt, while Boulos (1995) has questioned its occurrence in the country. Lack (1975) gave no mention of its occurrence in Egypt, and according to him this species is restricted to Turkey, Caucasus, Central Iran and West Syria, and the type was collected from the Caucasus. We were unable to trace any authentically identified material of *Picris strigosa* from Egypt, and therefore we consider that its occurrence in Egypt was probably based on erroneous identification.

87. *Tragopogon* L.

Annuals, biennials, or mostly herbaceous perennials; leaves entire, usually linear-lanceolate, clasping, parallel-veined; capitula solitary, pedunculate; phyllaries 1-seriate, basally  $\pm$  connate; receptacle naked; florets yellow, violet or purple; style-branches long, with very small hairs; achenes homomorphic, ellipsoid-fusiform, smooth or ribbed, often muricate or scabrid, usually with a long beak, abruptly contracted immediately below the pappus; pappus of many plumose bristles connate at the base, persistent. About 110 species, Mediterranean region, temperate Eurasia.

1. Involucre 2-3 times as long as the florets;  
beak of achene longer than the achene body 1. *T. sinuatus*  
+ Involucre as long as the florets or shorter;  
beak of achene  $\frac{1}{2}$  as long as the achene body, or shorter 2. *T. collinus*

1. *Tragopogon sinuatus* Avé-Lall, Plant. Ital. Bor. Germ. Austr. Rar. 17 (1829).

Syns. *Tragopogon australis* Jord., Cat. Jard. Dijon 1848: 32 (1848).

*Tragopogon coelesyriacus* Boiss., Diagn. Pl. Orient., ser. 1, 11: 47 (1849).

*Tragopogon longirostris* Bisch. ex Sch. Bip. in Webb & Berthel., Phyt. Canar. 2: 469, obs. (1850).

Biennial or short-lived herbaceous perennial, 20-60 cm; taproot fleshy; stems erect, branched or unbranched, terete, sulcate, swollen below the capitulum; basal leaves 8-20 (25) x 0.2-0.3 cm, linear, grass-like, the base sheathing and often subtending brownish lanate hairs, otherwise glabrous, the apex acuminate; cauline leaves shorter, remote, dilated and amplexicaul at the base, the apex acuminate; capitula solitary at the tips of stems and branches; involucre campanulate, glabrous; phyllaries usually 8, 3-4 x 0.3-0.4 cm at anthesis, elongate to 6 cm in fruit, linear-lanceolate, glabrous, spreading; florets purplish-violet; corolla-tube c. 1 cm, slender, pilose above; ligule 1.2-1.4 x 0.3-0.4 cm, 5-dentate at apex; achenes 2.8-3.2 cm; achene body 7-9 x 1.5 mm, 10-ribbed, muricate-tuberculate on the ribs, tapering to a beak 1.5-1.8 cm; apex of beak abruptly swollen, tapering to an annulus; pappus 1.8-2.2 cm, of rigid plumose bristles, persistent, straw-coloured.

S; hillsides, stony deserts. Atlantic Islands, Mediterranean region, Sinai.

2. *Tragopogon collinus* DC., Prodr. 7(1): 115 (1838).

Like *Tragopogon sinuatus*, but plant 10-25 cm; stems usually unbranched; leaves 5-12 x 0.4-1.6 cm, linear-lanceolate, usually with undulate margins; involucre as long as the florets or shorter; phyllaries 2-2.5 cm; achenes 1.6-1.8 cm including the beak; beak of the achene 1/2 as long as the achene, or shorter; pappus c. 2.5 cm.

S; hillsides, stony deserts. Sinai, Palestine, ?Arabia, Iran, Afghanistan, Pakistan.

88. *Geropogon* L.

Annuals; leaves linear, entire, amplexicaul, parallel-veined; capitula solitary, pedunculate; receptacle sparsely paleaceous; phyllaries 1-seriate, basally  $\pm$  connate; florets violet-purple; style-branches long, with very small hairs; achenes dimorphic, narrowly cylindrical or fusiform, scabrid or rather smooth, long-beaked; pappus dimorphic, of 2-5 coarse scabrid bristles in marginal florets, of numerous plumose and intertwined bristles in the inner. 1 species, Mediterranean region, southwest Asia to Afghanistan, Central Asia.

1. *Geropogon hybridus* (L.) Sch.Bip. in Webb & Berthel., Phyt. Canar. 2: 472 (1850).

Syns. *Tragopogon hybridum* L. Sp. Pl., ed. 1, 789 (1753).

*Geropogon glabrum* L., Sp. Pl., ed. 2, 1109 (1763).

Glabrous annual 20-60 cm; stems erect or ascending, usually branched, sulcate; leaves 4-15(20) x 0.3-0.8 cm, narrowly linear to linear-lanceolate, parallel-veined, entire, acuminate; base of cauline leaves amplexicaul; capitula solitary, terminal; receptacle sparsely paleaceous; involucre campanulate; phyllaries c. 8, 1-seriate, 3.2-4 x 0.2-0.3 cm, linear-lanceolate, long-acuminate, shortly connate at the base, glabrous; corolla-tube 3-4 mm, glabrous; ligule 1.2-1.5 x 0.3 cm, violet-purple, the apex 5-dentate; achenes dimorphic, narrowly cylindrical or fusiform, marginal achenes 3.3-3.8 x 0.2 cm including the beak; achene body c. 2 cm; pappus to 1.5 cm, of 5 scabridulous unequal awns: 2 (short); 1.5-3 mm, and 3 (long) 1.3-1.5 cm; inner achenes 2.3-2.5 x 0.1-0.2 cm including the beak; achene body c. 1.4 cm; pappus c. 2 cm, of c. 20 unequal plumose bristles.

N, O, M; weed of cultivation, waste ground, roadsides. Distribution as for the genus.

89. *Scorzonera* L.

Herbaceous perennials, rarely annuals or low shrubs; rootstock often thick, fleshy or tuberous; stems present, or plants stemless; leaves mostly in rosettes, sometimes alternate, simple, entire, pinnately lobed or pinnatisect, sessile or petiolate; capitula solitary or laxly corymbose, pedunculate; involucre campanulate or subcylindrical; phyllaries 2-seriate; florets yellow, violet or purple; style-branches long, with very small hairs; achene terete or ellipsoid-fusiform, smooth or frequently ribbed, often muricate or scabrid, beakless, glabrous or villous; pappus of numerous plumose and intertwined bristles, often scabrid-barbellate at apex. About 175 species, Europe, Mediterranean region, southwest and Central Asia.

1. Florets purplish-violet

+ Florets yellow, ligules often reddish beneath

2

3

2. Leaves linear, with sheathing base  
+ Leaves lanceolate, the base not sheathing
1. *S. undulata*  
2. *S. drarii*
3. Plant densely woolly; rootstock 3-6 x 1-2 cm; achenes 7-8 mm,  
densely long-woolly  
+ Plant stellate-hairy; rootstock 8-15(20) x 2-5 cm; achenes 1-1.8 cm, glabrous
5. *S. judaica*  
4
4. Rootstock to 5 cm diam.; achenes 1.5-1.8 cm, at least some achenes  
densely muricate  
+ Rootstock to 2.5 cm diam.; achenes 1-1.4 cm, minutely rugose
3. *S. schweinfurthii*  
4. *S. mollis*

1. ***Scorzonera undulata*** Vahl, Symb. Bot. 2: 86 (1791).  
Syn. *Scorzonera alexandrina* Boiss., Fl. Orient. 3: 760 (1875).

Sparsely tomentose herbaceous perennial, 10-30 cm; rootstock 1-1.8 cm diam., vertical, ± oblong-cylindrical, crowned by leaf remains; stems simple or branched near the base, erect, sulcate; leaves 3-12 x 0.2-0.6 cm, the basal linear to linear-lanceolate, the margins entire or undulate, the apex long-acuminate, the base sheathing; cauline leaves much shorter, few, ± similar to the basal, amplexicaul; capitula solitary, terminal; involucre 1.6-2.6 x 0.8-1.2 cm, campanulate, glabrous; phyllaries 2-seriate, scarious-margined, the outer 0.5-1.1 x 0.3-0.5 cm, broadly ovate to lanceolate, subacute; inner phyllaries 1.6-2.6 x 0.5-0.8 cm, oblong-lanceolate, obtuse or subacute; corolla-tube 0.6-1 cm; ligule 2.5-3 cm, purplish; achenes 1-1.2 x 0.1-0.15 cm, cylindrical-ellipsoid, scabrid to squamate at the ribs; pappus 1.5-2.2 cm, of unequal plumose bristles.

M, D; sandy and calcareous ground, barley fields, roadsides. Morocco, Algeria, Tunisia, Libya, Egypt.

NOTE: *Scorzonera undulata* is a widespread species in the coastal region west of Alexandria, especially between Sollum and Mersa Matruh, but rare in the desert regions. The rootstock is eaten by local people; flowering capitula have a pleasant vanilla-like scent.

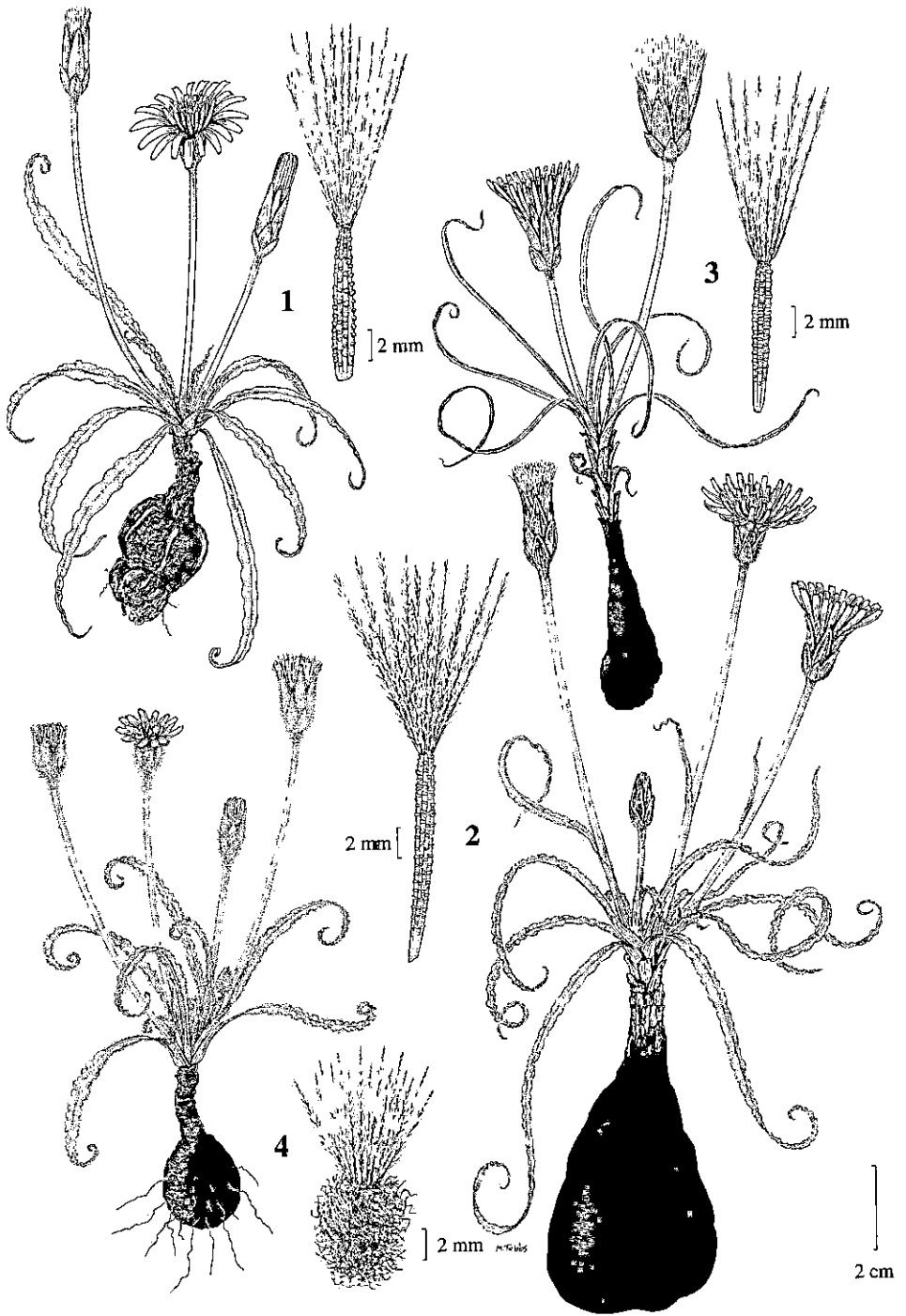
2. ***Scorzonera drarii*** Täckh., Svensk Bot. Tidskr. 26: 375 (1932).

Glabrescent herbaceous perennial c. 5 cm; rootstock c. 3.5 cm diam.; stems simple, erect, white-pubescent at the base, glabrous above; leaves 3-5 x 1-1.5 cm, mainly in rosettes, lanceolate, attenuate to a winged petiole 1-2 cm, the margins crispate, the apex acute, the base not sheathing; capitula solitary, terminal; involucre c. 1.6 x 1.2 cm, campanulate, glabrous; phyllaries 2-seriate, scarious-margined, the outer 4-6 x 2 mm, broadly ovate, obtuse; inner phyllaries 1.6 x 0.4 cm, lanceolate, obtuse; corolla-tube c. 1 cm, ligule c. 1.4 x 0.2 cm, 5-dentate at the apex, purplish-violet; style-branches 5 mm, covered with short hairs; mature achenes not seen.

S (Ain el-Gedirat); edges of cultivation. Endemic.

NOTE: The type of *Scorzonera drarii* was collected in Ain el-Gedirat, northern Sinai, 13-15 March 1930, M. Drar, s.n. (CAIM).

3. ***Scorzonera schweinfurthii*** Boiss., Fl. Orient. Suppl. 320 (1888).  
Syn. *Scorzonera edumea* Eig in Eig, Zohary & Feinbr., Anal. Fl. Palaest. 298 (1948), nom. inval.



**Plate 70.** COMPOSITAE: *Scorzonera undulata* 1, habit; achene (up right). *Scorzonera schweinfurthii* 2, habit; achene (up left). *Scorzonera mollis* 3, habit; achene (up right). *Scorzonera judaica* 4, habit; achene (down right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.



Appressed-greyish, stellate-hairy herbaceous perennial, 10-25 cm; rootstock 8-15 (20) x 2-5 cm, (c. 5 cm diam. in the lower part), brown, fleshy, attenuate above and crowned by leaf-remains; stems usually simple, scapose; leaves 4-15 x 0.2-1 cm, basal and cauline, mostly narrowly linear, sometimes oblong-linear, dilated at base, often curved or coiled, the margins entire or undulate; peduncle to 20 cm, thickened in fruit; capitula solitary, terminal; involucre 1.8-2.5 x 1-1.2 cm, campanulate-cylindrical, elongate in fruit to 3.3 cm, glabrescent; phyllaries 2-seriate, the margins scarious and ciliate, the outer 0.8-1.2 x 0.5-0.8 cm, broadly ovate-lanceolate, subacute; inner phyllaries 1.8-2.5 x 0.4-0.6 cm, oblong-lanceolate, obtuse; corolla-tube 0.6-1.1 cm; ligule 1.8-2.2 cm, hairy just above the corolla-tube, yellow, the marginal purplish beneath; achenes 1.5-1.8 x 0.12 cm, terete, striate, glabrous, slightly to densely muricate; pappus 1.4-1.8 cm, of numerous unequal plumose bristles.

De (Galala), S; rocky hillsides. Egypt, Palestine, Saudi Arabia.

NOTE: The holotype of *Scorzonera schweinfurthii* was collected in the Eastern Desert, Egypt "in planitie elatâ Galala deserti Arabici Aegypti mediae", Schweinfurth 75 (G). The entire plant, including the rootstock, is eaten by local people.

4. *Scorzonera mollis* M. Bieb., Fl. Taur.-Cauc. 3: 522 (1819) var. *longifolia* Boiss., Fl. Orient. 3: 762 (1875).  
Syn. *Scorzonera syriaca* Boiss. & Blanche, Diagn. Pl. Orient., ser. 2, 3: 93 (1856).

Like *Scorzonera schweinfurthii*, but rootstock only to 2.5 cm diam.; leaves narrower (2-4 mm wide), with a sparse indumentum of stellate hairs, later glabrescent; achenes 1-1.4 x 0.15 cm, minutely rugose.

S; rock hillsides. Sinai, Palestine, Lebanon, Syria.

NOTE: Täckholm, p. 599 (1974) enumerated two varieties of *Scorzonera mollis* in Egypt: var. *glabrata* Bornm. and var. *longifolia* Boiss. In this treatment, only var. *longifolia* is recognized, as the plants often become glabrescent later. The closely allied *Scorzonera schweinfurthii* could easily be confused with *S. mollis* var. *longifolia*, as they vary in minor characters, and they overlap in most of the area of their distribution. New collections of both taxa are desired for further research to better understand their taxonomic relationships.

5. *Scorzonera judaica* Eig in Eig, Zohary & Feinbrun, Plants of Palestine, Analytical Key 399 (1931), description in Hebrew.  
Syns. *Scorzonera pseudolanata* Grossh., Fl. Kavk. 4: 235 (1934), description in Russian.  
*Scorzonera pseudolanata* Grossh., Trudy Bot. Inst. Akad. Nauk Baku 2: 258 (1936), description in Latin.

Canescent, densely woolly, herbaceous perennial 10-20 cm; rootstock 3-6 x 1-2 cm, fleshy, brown; leaves 4-12 x 0.3-1 cm, linear-lanceolate, spreading, often coiled, the margins undulate, the apex acute or acuminate; capitula solitary, terminal; involucre 1.1-1.4 x 0.6-0.8 cm, campanulate, densely woolly, accrescent and elongate to 2 cm in fruit; phyllaries 2-seriate, the outer few, 5-7 x 1.5 mm, lanceolate, acute; inner phyllaries 1.1-1.4 x 0.2 cm, oblong-lanceolate, scarious-margined, acuminate; corolla-tube 3-4 mm;

ligule 0.8-1.1 cm, yellow, purplish beneath; achenes 7-8 x 4 mm, obconical, densely long-woolly; pappus 1-1.1 cm, brownish, of numerous plumose bristles, scabrous near the tips.

S; desert wadis. Sinai, Palestine, Lebanon, Syria, Turkey, Iraq, Iran.

90. *Launaea* Cass.

Syns. *Zollikoferia* DC. non Nees, *Microrhynchus* Lees.

Literature: Kilian, N. 1997. Revision of *Launaea* Cass. (Compositae, Lactuceae, Sonchinae). Englera 17: 1-478.

Annuals, perennials, short-lived perennials or low spinescent shrubs; leaves sessile, usually in rosettes; lamina sinuate-dentate to pinnatifid; cauline leaves often clasping to auriculate; peduncle bracteate; capitula cylindrical, with 7-40 florets, or subglobose with up to 100 florets; receptacle epaleate, glabrous; phyllaries multi-seriate,  $\pm$  imbricate; ligule yellow, sometimes tinged red or violet; corolla-tube pubescent with unicellular trichomes in the upper part; anther-tube with rounded apical and sagittate basal appendages; style-branches yellow; achenes homomorphic or heteromorphic, subterete, columnar or prismatic, truncate or beaked, ribbed; pappus homomorphic or dimorphic, with soft or cottony hairs and/or setaceous bristles, persistent or deciduous. 54 species, Old World, but mainly Africa and southwest Asia.

- |  |   |   |
|--|---|---|
| 1. Shrub; branches spinescent  | 1. <i>L. spinosa</i>                            | 2 |
| + Annual or herbaceous perennial; branches unarmed   |   |   |
| 2. Delicate annual; involucre c. 2 mm wide;<br>florets 7-14 per capitulum  | 3. <i>L. massauensis</i>                        | 3 |
| + Annual or short-lived perennial; involucre over 4 mm wide;<br>florets more than 15 per capitulum   |   |   |
| 3. Capitula subglobose, sessile, densely clustered towards the apex of<br>the inflorescence; achenes conspicuously winged  | 5. <i>L. capitata</i>                           | 4 |
| + Capitula slender, usually pedunculate, not densely clustered;<br>achenes not winged  |   |   |
| 4. Marginal achenes epapillose   |   | 5 |
| + Marginal achenes with a dense indumentum of soft hyaline papillae<br>(magnification x 40)  |   | 6 |
| 5. All achenes truncate at the apex; pappus 0.7-1 cm, dimorphic, persistent,<br>of numerous fine soft hairs and a few setaceous bristles   | 2. <i>L. nudicaulis</i>                         |   |
| + Inner achenes tapering towards the apex, the marginal with distinctly<br>pointed apex; pappus 5-8 mm, homomorphic, deciduous as a unit with<br>the pappus-disc, of numerous setaceous bristles | 4. <i>L. procumbens</i>                         |   |
| 6. Pappus deciduous, homomorphic, of c. 20-30 setaceous bristles,<br>$\pm$ of equal length   | 9. <i>L. mucronata</i> subsp. <i>cassiniana</i> | 7 |
| + Pappus persistent, dimorphic, of soft hairs and setaceous bristles,<br>or homomorphic and entirely of cottony soft hairs, without setaceous bristles   |   |   |

7. Capitula nodding in bud; achenes with hyaline wings;  
pappus homomorphic, entirely of cottony hairs and without  
setaceous bristles 7. *L. angustifolia* subsp. *arabica*
- + Capitula not nodding in bud; achenes without wings; pappus  
heteromorphic, of soft cottony hairs and setaceous bristles 8
8. Plant 15-25 cm, with a basal leaf rosette and several leafless branches;  
pappus ± deciduous, of ± equal number of soft hairs and setaceous  
bristles, or ± all bristles 6. *L. amal-aminae*
- + Plant to 50(90) cm, with basal and cauline leaves; pappus persistent,  
of numerous soft hairs and a smaller number of longer inner setaceous bristles 9
9. Short-lived perennial; innermost mature achenes distinctly 4-horned at the base,  
with 4 main ribs, each with 2 secondary ribs;  
pappus (0.7)1-1.2 cm 8. *L. fragilis* subsp. *fragilis*
- + Annual, innermost mature achenes with a tubular base and almost  
even basal edge, ± columnar, with 4 main ribs, secondary ribs  
not differentiated, transversely finely ± papillose-wrinkled;  
pappus 6-9 mm 9. *L. mucronata* subsp. *mucronata*

1. *Launaea spinosa* (Forssk.) Sch.Bip. ex Kuntze, Revis. Gen. Pl. 1: 350 (1891).

Syns. *Prenanthes spinosa* Forssk., Fl. Aegypt.-Arab. 144 (1775).

*Atalanthus spinosus* (Forssk.) D. Don, Edinb. New Philos. J. 6: 311 (1829).

*Sonchus spinosus* (Forssk.) DC., Prodr. 7: 189 (1838).

*Rhabdotheca spinosa* (Forssk.) Webb in Hook., Niger Fl. 147 (1849).

*Zollikoferia spinosa* (Forssk.) Boiss., Fl. Orient. 3: 826 (1875).

Hemispherical shrub 0.5-1.8 m; stems spinescent, intricately branched, usually leafless; leaves, when present, 1.5-8 x 0.2-3 cm, at the base of juvenile shoots and soon deciduous, linear or linear-spathulate and entire, or pinnatifid with remote, linear acute segments; capitula solitary at the tips of terminal branches; florets 8-13 per capitulum; phyllaries 0.9-1.1 x 0.1-0.35 cm, the outer 1-1.5 x 1 mm, ovate, imbricate, the inner gradually longer and ovate-lanceolate, the innermost lanceolate; florets bright yellow; ligule c. 6.5 x 2.2 mm; corolla-tube c. 5.5 mm; anther-tube c. 3.1 mm; style-branches 3-4 mm; achenes 2.8-4 x 0.6-1.2 mm, ± columnar, ± homomorphic, with 5 main ribs, smooth to transversely wrinkled, truncate at both ends; pappus 4-5 mm, of numerous setaceous bristles, persistent.

De, S; rocky deserts and escarpments. Egypt, Palestine, northwest Saudi Arabia.

NOTE: The type of *Prenanthes spinosa* was collected in Suez, Egypt, 16-18. Sept. 1762 by Forsskål (lectotype, BM).

2. *Launaea nudicaulis* (L.) Hook. f., Fl. Brit. Ind. 3: 416 (1881).

Syns. *Chondrilla nudicaulis* L., Man. Alt. 278 (1771).

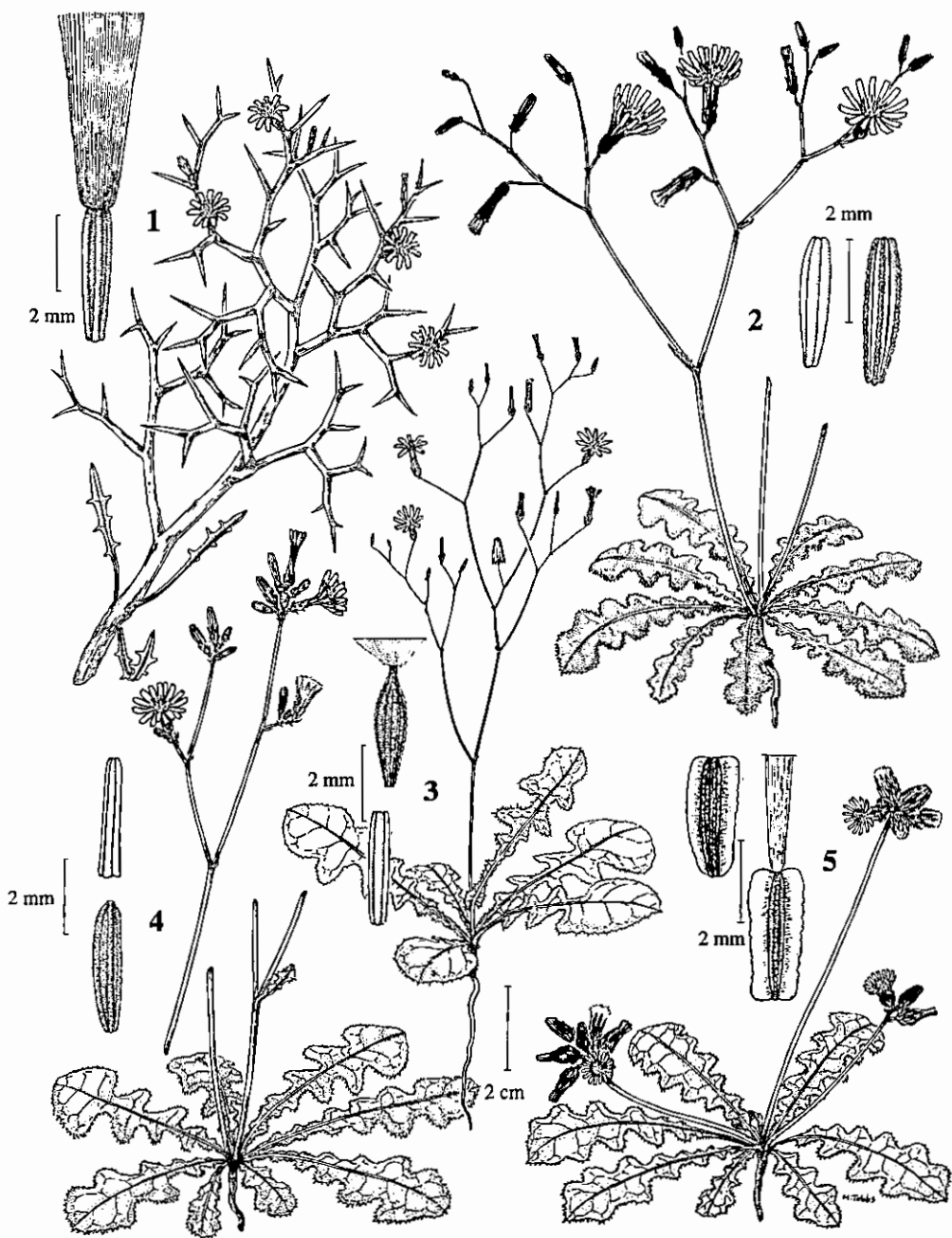
*Lomatolepis nudicaulis* (L.) Cass. in Cuvier, Dict. Sci. Nat. 48: 424 (1827).

*Microrhynchus nudicaulis* (L.) Less., Syn. Gen. Compos. 139 (1832).

*Sonchus nudicaulis* (L.) Sch.Bip. in Webb & Berthel., Hist. Nat. Iles Canar. 2 (2): 427 (1849-50).

*Zollikoferia nudicaulis* (L.) Boiss., Fl. Orient. 3: 824 (1875).

For full synonymy see Kilian, pp. 217-218 (1997).



**Plate 71. COMPOSITAE:** *Launaea spinosa* 1, flowering branch; achene (up left). *Launaea nudicaulis* 2, habit; marginal achene (right, outer); inner achene (right, inner). *Launaea massauensis* 3, habit; marginal achene (middle left); inner achene (down left). *Launaea procumbens* 4, basal part and flowering branch; marginal achene (down left); inner achene (middle left). *Launaea capitata* 5, habit; marginal achene (up); inner (pappose) achene (within). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

Perennial 10-60 cm; stems usually several from the base, procumbent, ascending or erect; leaves 2-10(18) x 0.5-3 (5) cm, mainly in a basal rosette, irregularly 1-(2) pinnatifid, the segments sinuate-dentate with a white-cartilagineous margins; cauline leaves much reduced or absent; peduncle 0.2-1.2 cm, bracteate; capitula single on the tips of branches of a lax divaricate cymose inflorescence; phyllaries 4-5-seriate, the outer 1.5-3 x 1.5-2 mm, ovate, subacute, scarious except on the green midrib; middle phyllaries 3.5-6 x 2 mm, oblong, subacute, broadly scarious-margined; the inner 1.1-1.4 x 0.2-0.3 cm, oblong-linear; florets 16-30 per capitulum; ligule 0.8-1.1 x 0.2-0.25 cm, bright yellow; corolla-tube 6-9 mm; anther-tube 2.8-4 mm; style-branches 2-3 mm; achenes 2.8-5 x 0.6-1 mm, heteromorphic, truncate at the apex, the inner  $\pm$  columnar with 4 main ribs and undifferentiated secondary ribs, the marginal with 5 main ribs and  $\pm$  distinct secondary ribs, slightly curved and weakly compressed; pappus 0.7-1 cm, dimorphic, persistent, of numerous fine soft hairs and a few setaceous bristles.

N, O, M, D, R, GE, S; sandy and alluvial soils, desert plains and wadis, edges of cultivation. Canary Islands, southern Spain, Mauritania, Morocco, Algeria, Sahara, Tunisia, Libya, Chad, Egypt, Palestine, Syria, Iraq, Arabia, Iran.

NOTE: The type of *Zollikoferia nudicaulis* was collected in Cairo, Egypt, "in palmetis ad El Marg", 27 April 1908, Bornmüller 10830 (typ. conserv. JE, isotypes G, LD, LE).

3. ***Launaea massauensis*** (Fresen.) Sch.Bip. ex Kuntze, Revis. Gen. Pl. 1: 351 (1891).

Syns. *Heterachaena massauensis* Fresen., Mus. Senckenb. 3: 74 (1839).

*Lactuca massauensis* (Fresen.) Sch. Bip. ex A. Rich., Tent. Fl. Abyss. 1: 460 (1848).

*Sonchus massauensis* (Fresen.) Sch. Bip. in Schweinf. & Asch., Beitr. Fl. Aethiop. 160 (1867).

*Zollikoferia massauensis* (Fresen.) Boiss., Fl. Orient. 3: 825 (1875).

For full synonymy and notes on nomenclature, see Kilian, p. 268 (1997).

Delicate annual 10-50(80) cm; taproot slender; stems usually single or few from the base, much-branched in the upper part; leaves 2-8(12) x 1.5-4 cm, mainly in a basal rosette, lyrate, the margins denticulate; cauline leaves few, just above the basal rosette, auriculate; peduncle 1-1.8 cm, capillary; capitula in a lax monochasial inflorescence; florets 7-14 per capitulum; involucre 0.8-1 x 0.2 cm; phyllaries 3-4-seriate, scarious-margined, the outer 1-1.5 x 1 mm, ovate, subacute, the middle 2-3.5 x 1 mm, oblong-lanceolate, the inner 7-9 x 1-1.5 mm, lanceolate; ligule 4-5.5 x 1 mm, yellow; corolla-tube 3.5-4 mm; anther-tube c. 1 mm; style-branches 0.6-1 mm; achenes 2.5-3.5 x 0.5-0.6 mm, heteromorphic, the inner  $\pm$  4-angular, with 4 main ribs, the base truncate, the apex cuspidate, smooth or slightly wrinkled, yellowish; marginal achenes slightly compressed and curved, with 5 main ribs, transversely wrinkled, brownish to black; pappus 4-5 mm, persistent, dimorphic, of numerous soft cottony hairs and a few setaceous bristles.

De, R, GE; sandy and gravelly desert wadis and alluvial desert plains. Southeast Egypt, Sudan, Ethiopia, Eritrea, Djibouti, Arabia, Socotra, southwest Iran.

4. ***Launaea procumbens*** (Roxb.) Ramayya & Rajagopal, Kew Bull. 23: 465 (1969).

Syns. *Prenanthes procumbens* Roxb., Fl. Ind., ed. 1832, 3: 404 (1832).

*Youngia procumbens* (Roxb.) DC., Prodr. 7: 193 (1838).

*Microrhynchus fallax* Jaub. & Spach, Ill. Pl. Orient. 3: 106, f. 276 (1848).

*Microrhynchus arabicus* Jaub. & Spach, Ill. Pl. Orient. 3: 107, f. 277 (1848).

*Zollikoferia fallax* (Jaub. & Spach) Boiss., Fl. Orient. 3: 824 (1875).

*Launaea procumbens* (Roxb.) Lack in Rech. f., Fl. Iranica 122: 155 (1977).

For full synonymy see Kilian, p. 278 (1997).

Like *Launaea nudicaulis*, but inner achenes slightly tapering towards the apex, the marginal with distinctly pointed apex; pappus 5-8 mm, homomorphic, deciduous as a unit with the pappus-disc, of numerous setaceous bristles.

D, S; sandy deserts. Egypt, Arabia, Iraq, Iran, Turkmenistan, Uzbekistan, Tadzhikistan, Afghanistan, Pakistan, India, Nepal, Burma, China.

NOTE: *Launaea procumbens* is easily confused with *L. nudicaulis* due to their similar habits. According to Kilian, p. 281 (1997), *Launaea procumbens* is only known from a few localities in Egypt (near the Giza Pyramids; Helwan, near Cairo; Karnak, Luxor; Qoseir; El-Tor, Sinai), all based on old collections. On the other hand, the widely distributed *Launaea nudicaulis* is fairly common in diverse habitat types in Egypt. The type of *Microrhynchus arabicus* was collected in Sinai, "Arabia Petraea, ad fontes thermales, circa El Tor", 10 April 1838, Botta *s.n.* (holotype, P).

5. ***Launaea capitata*** (Spreng). Dandy in F. W. Andrews, Fl. Pl. Sudan 3: 40 (1956).

Syns. *Sonchus capitatus* Spreng., Syst. Veg., ed. 16, 3: 650 (1826).

*Sonchus mareoticus* Delile, Descr. Egypte, Hist. Nat., f. 64: 12 (1826),  
nom. nud.

*Lomatolepis glomerata* Cass. in Cuvier, Dict. Sci. Nat. 48: 423 (1827),  
nom. illeg.

*Microrhynchus glomeratus* (Cass.) Jaub. & Spach, Ill. Pl. Orient. 3: 103, f.  
275 (1848), comb. illeg.

*Zollikoferia glomerata* (Cass.) Boiss., Fl. Orient. 3: 826 (1875), comb.  
illeg.

*Launaea glomerata* (Cass.) Hook. f., Fl. Brit. India 3: 417 (1881), comb.  
illeg.

Annual, sometimes perennating over a second year; stems 10-40 cm, often branched, procumbent to ascending,  $\pm$  leafless; leaves 2-12 x 1-5 cm, in a rosette, lyrate-spathulate, sinuate-dentate, the margins white-cartilagineous; capitula subglobose, sessile, densely clustered towards the apex of a monopodial branched or unbranched inflorescence; phyllaries 4-seriate, imbricate, all conspicuously scarious-margined; outer phyllaries 2-3.5 x 1.5-2.5 mm, broadly ovate, obtuse, the middle longer, oblong-lanceolate; inner 0.8-1.2 cm, lanceolate, the scarious margins narrower than in the outer phyllaries; florets 25-50 per capitulum; ligule 4.5-6 x 1.2-1.5 mm, bright yellow; corolla-tube 5.5-7 mm; style-branches c. 1 mm; achenes 3.2-4 x 1.2-2 mm, heteromorphic, conspicuously winged, the inner with 4 main ribs, the marginal 5-ribbed, slightly curved, wrinkled; pappus 4.5-7 mm, deciduous with the pappus disc, homomorphic, of numerous setaceous bristles.

N, O, M, D, R, GE, S; desert wadis, sandy and alluvial plains, edges of cultivation, often a weed in reclaimed desert land. Canary Islands, Niger, Mauritania, Morocco, Algeria, Tunisia, Libya, Egypt, Palestine, Arabia, Iran, Afghanistan, Pakistan, northwest India, Sudan, Eritrea.

NOTE: The type of *Chondrilla capitata* was collected in Cairo desert, Egypt, 12.1817-11.1818, Sieber *s.n.* (Holotype P; isotypes B, BM, BR, C, FI-W, FR, G, JE, K, KIEL, L, LE, M, W).

6. *Launaea amal-aminae* N. Kilian, Englera 17: 346 (1997).

Syns. *Launaea cassiniana* (Boiss.) Kuntze, Revis. Gen. 1: 350 (1891) var. *marginata* Maire, Bull. Soc. Hist. Nat. Afr. Nord 24: 221 (1933), pro parte.

*Launaea procumbens* sensu Alavi, Fl. Libya 107: 383, pro parte; non sensu (Roxb.) Ramayya & Rajagopal.

Perennial 15-25 cm; stems several from the base, ascending, branched; leaves 3-8 x 1-3 cm, in a basal rosette, oblanceolate, pinnatipartite, the segments oblong to deltoid with denticulate margins; peduncle 0.8-3 cm, bracteate; capitula numerous, in a lax monopodially branched, leafless inflorescence; phyllaries 3-4-seriate, imbricate, the outer c. 2 x 1.5 mm, ovate, white-cartilaginous at the mucronate apex; middle phyllaries 4-7 x 1.2-2 mm, lanceolate, the inner 0.8-1.1 x 1.2-2 mm, linear-lanceolate; florets 20-30 per capitulum; ligule 6-8 x 1.5-2.5 mm, yellow; corolla-tube 3-4 mm; style-branches 1.5-2 mm; achenes 2.5-4.5 x 0.2-0.4 mm, the inner columnar to slightly fusiform, with 4 main ribs, finely wrinkled, the marginal slightly compressed and curved, with 5 main ribs, all dark brown; pappus 5-8 mm,  $\pm$  deciduous, dimorphic, of  $\pm$  equal number of soft hairs and longer setaceous bristles, or almost all setaceous bristles.

De, S; desert wadis and sandy plains. Mauritania, Morocco, Algeria, Libya, Egypt, western Saudi Arabia.

7. *Launaea angustifolia* (Desf.) Kuntze, Revis. Gen. Pl. 1: 351 (1891) subsp. **arabica** (Boiss.) N. Kilian, Willdenowia 25: 274 (1995).

Syns. *Zollikoferia arabica* Boiss., Diagn. Pl. Orient., ser. 1, 7: 12 (1846).

*Zollikoferia foxii* Post, Fl. Syria, Pal., Sinai, ed. 1, 19 (1896).

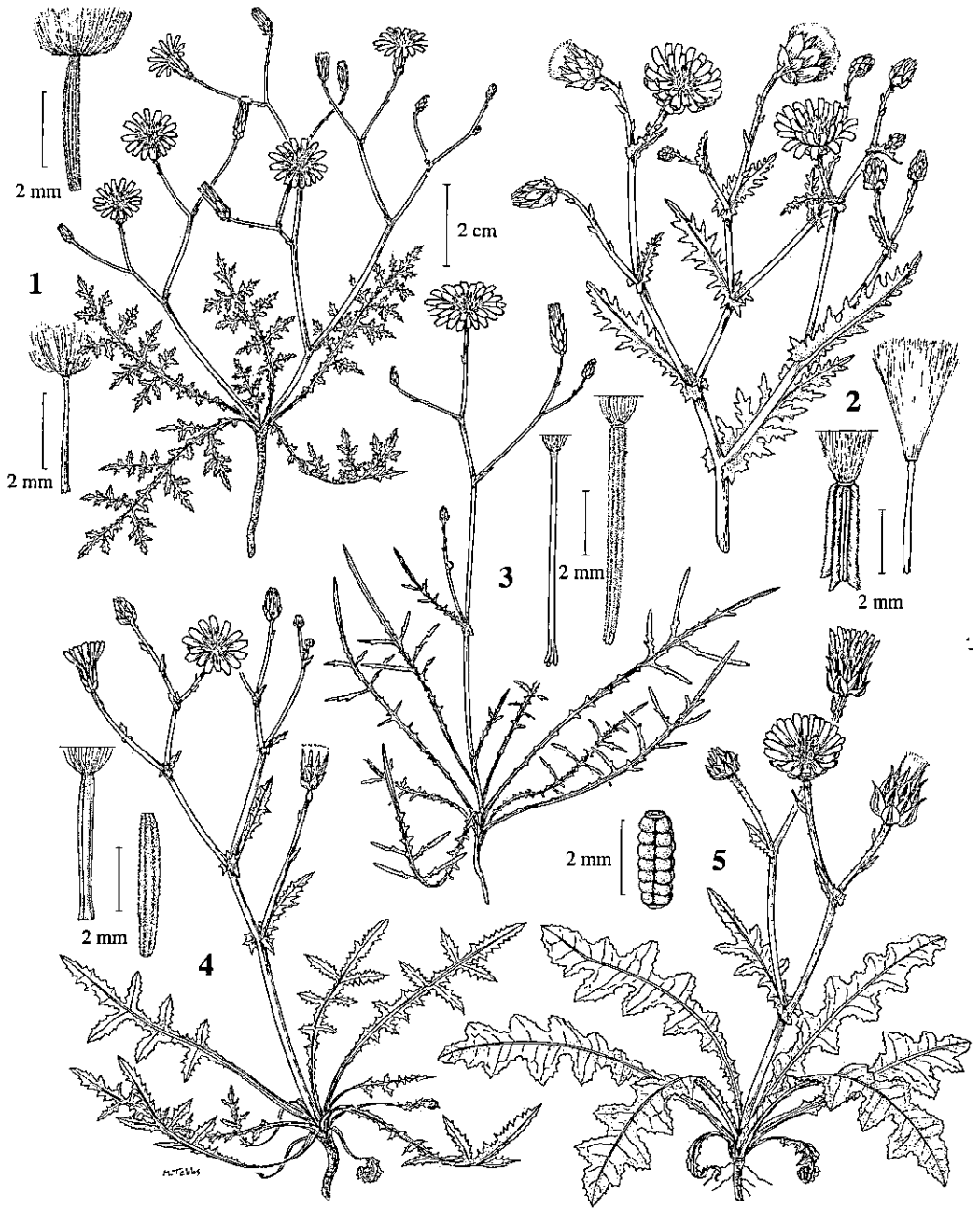
*Launaea foxii* (Post) Eig, Feddes Repert. 63(1): 48 (1931).

*Launaea arabica* (Boiss.) H. Lindb., Acta Sci. Fenn., ser. B, Opera Biol. 1(2): 163 (1932).

Annual 10-30(-50) cm; stems erect, branched above; leaves (2)4-8(12) x 0.5-3(4) cm, mainly at the base, oblong-lanceolate, pinnatifid to pinnatisect, the segments oblong to deltoid, margins sinuate-dentate and white-cartilaginous, the base amplexicaul; cauline leaves smaller or much reduced, auriculate; peduncle 1.5-6 cm, bracteate; capitula nodding in bud, 1-1.5 x 1-1.2 cm, campanulate, few, in lax inflorescences; phyllaries 4-seriate, imbricate, the outer 2.5-7 x 2-4 mm, ovate, acute; inner 0.9-1.4 x 2-3.5 mm, linear-lanceolate, narrowly scarious-margined, obtuse; florets 60-100 per capitulum; ligule 1.2-2 x 0.3-0.5 mm, bright yellow; corolla-tube 5-8 mm; style branches 2-2.5 mm; achenes 2.5-3.2 x 0.4-1.6 mm, heteromorphic, all densely papillose, with long hyaline papillae, connate to form a wing on the main ribs; inner cylindrical,  $\pm$  4 angular, the marginal slightly compressed and curved, 5-ribbed; pappus 4-6 mm, persistent, homomorphic, with numerous cottony hairs, without setaceous bristles.

S; sandy and stony deserts. Morocco, Algeria, Tunisia, Libya, Sinai, Palestine, Iraq, Saudi Arabia, Kuwait.

NOTE: According to Kilian, op. cit., pp. 361-369, two subspecies are known of *Launaea*



**Plate 72. COMPOSITAE:** *Launaea amal-aminae* 1, habit; outer achene (up left); inner achene (down left). *Launaea angustifolia* subsp. *arabica* 2, flowering and fruiting branch; outer (winged) and inner achenes (down right). *Launaea fragilis* subsp. *fragilis* 3, habit; marginal achenes (right, outer); inner achenes (right, inner). *Launaea mucronata* subsp. *mucronata* 4, habit; marginal achenes (left, inner); inner achenes (left, outer). *Reichardia tingitana* 5, habit; achene (up left). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.



*angustifolia*: subsp. *angustifolia*, restricted to Algeria, Tunisia and Libya, and subsp. *arabica*, widely distributed in the Saharo-Arabian region. Subsp. *angustifolia* differs by the glabrous innermost achenes and the pappus of 2-6 setaceous bristles within the cottony hairs.

8. ***Launaea fragilis*** (Asso) Pau, Bol. Soc. Aragonesa Ci. Nat. 16: 68 (1917) subsp. ***fragilis***  
Syns. *Lactuca fragilis* Asso, Syn. Stirp. Aragon 109 (1779).  
*Sonchus chondrilloides* Desf., Fl. Atlant. 2: 226 (1799).  
*Launaea chondrilloides* (Desf.) Hook. f., Fl. Brit. Ind. 3: 415 (1881).  
*Zollikoferia tenuiloba* Boiss., Diagn. Pl. Orient., ser. 2, 11: 50 (1849).  
*Launaea tenuiloba* (Boiss.) Kuntze, Revis. Gen. Pl. 1: 351 (1891).  
*Launaea resedifolia* sensu auct. mult.

For full synonymy and nomenclatural notes see Kilian, pp. 374-377 (1997).

Perennial 10-50 cm, with wide-trailing shoot-bearing root system; stems 1 to many, erect, usually branched; leaves 4-12(15) x 0.5-4.5 cm,  $\pm$  in a rosette, irregularly pinnatisect, the segments sinuate-dentate, the base clasping; cauline leaves smaller, remote, linear-lanceolate, subentire or dentate, the uppermost bract-like; peduncle 1.5-6 cm, bracteate; capitula few, in lax corymbs; phyllaries 3-4-seriate, imbricate, scarious-margined, the apex with a white appendage; outer 2-3.5 x 1.5-2.5 mm, broadly ovate, the inner 0.8-1.4 x 1.5-3 mm, lanceolate to linear-lanceolate; florets 20-60 per capitulum; ligule 0.8-1.2 x 2.5-3.5 mm, bright yellow; corolla-tube c. 4 mm; style-branches 2-2.5 mm; achenes 4-7.5 x 0.4-0.7 mm, cylindrical, heteromorphic; innermost mature achenes 6-7.5 mm, distinctly 4-horned at the base, with 4 main ribs, each with 2 well-developed secondary ribs,  $\pm$  glabrous, brownish, the outermost 4-5 mm, with 5 main ribs,  $\pm$  compressed, slightly curved; pappus (0.7)1-1.2 cm, persistent, dimorphic, of numerous soft hairs and longer setaceous inner bristles.

M, D, S; sandy and calcareous deserts and coastal plains. Spain, Sicily, Morocco, Algeria, Tunisia, Libya, Egypt, Palestine, Lebanon, Cyprus.

NOTE: *Launaea fragilis* was erroneously known as *L. resedifolia* (see note, p. 374, Kilian (1997)). Two subspecies are recognized, of which subsp. *fragilis* occurs in Egypt while subsp. *asirensis* Kilian is restricted to Saudi Arabia and Yemen, in the Asir mountain range, southwest Arabia. It differs from subsp. *fragilis* by the absence of secondary ribs on the innermost mature achenes.

9. ***Launaea mucronata*** (Forssk.) Muschl., Man. Fl. Egypt 2: 1057 (1912).  
Syns. *Leontodon mucranatum* Forssk., Fl. Aegypt.-Arab. 144 (1775).  
*Zollikoferia mucronata* (Forssk.) Boiss., Diagn. Pl. Orient., ser. 1, 7: 12 (1846).  
*Launaea resedifolia* subsp. *mucronata* (Forssk.) Maire, Bull. Soc. Hist. Nat. Afr. Nord 28: 366 (1937).

Short-lived perennial, 10-50 (80) cm, greyish-glaucous; stems erect, usually single, much branched above; leaves 2.5-15(20) x 0.5-6(8) cm,  $\pm$  in a basal rosette, 1-2-pinnatisect, the segments oblong to oblong-linear and often remote, the margins sinuate-dentate and white-cartilaginous, petiolate, the base auriculate; upper cauline leaves much smaller, conspicuously auriculate, the auricles variously dissected; peduncle 1.5-6 (8) cm, bracteate; capitula usually numerous, forming lax subcorymbose synflorescences; phyllaries 3-4-seriate, imbricate, the outer 2-4.5 x 1.6-2 mm, broadly ovate to oblong-ovate, subacute, typically without scarious margin, becoming accrescent at the base and

the midrib in fruit; inner phyllaries 0.8-1.3 x 0.2-0.3 cm, narrowly scarious-margined; florets 30-80 per capitulum; ligule 7-9 x 2-3 mm, bright yellow; corolla-tube 4.5-6 mm; style branches 1.5-2.2 mm; achenes 3-7 x 0.3-0.8 mm, heteromorphic, the inner  $\pm$  columnar, with a tubular even base, 4 main ribs, the secondary ribs not differentiated; marginal achenes 5-ribbed, slightly curved, compressed and shorter than the inner; pappus 4-9 mm, homomorphic, of 20-30 setaceous bristles  $\pm$  of equal length and deciduous, or dimorphic and persistent, of soft hairs and setaceous bristles.

Two subspecies are known; both occur in Egypt:

subsp. **mucronata**

Syns. *Rhabdotheca tenuiloba* Pomel, Bull. Soc. Climatol. Alger 13: 263 (1875).

*Zollikoferia tenuilobes* (Pomel) Batt., Fl. Algérie 1: 557 (1889), non Boiss. (1849).

*Launaea resedifolia* var. *pu!chella* Pamp., Agric. Colon. 22: 366, f. 2 (1928).

For full synonymy and nomenclatural notes, see Kilian, pp. 401-402 (1997).

Annual; achenes 3.5-5.5(7) x 0.3-0.8 mm; innermost achenes with a tubular base and almost even basal edge,  $\pm$  columnar, with 4 main ribs, the secondary ribs not differentiated, transversely finely  $\pm$  papillose-wrinkled; pappus 6-9 mm, persistent, white, dimorphic, of numerous soft hairs and a smaller number of longer setaceous bristles.

N, O, D, R, GE, S; sandy and stony deserts, alluvial plains, edges of cultivation. Canary Islands, Niger, Mauritania, Morocco, Algeria, Tunisia, Libya, Egypt, Sudan, Eritrea, Palestine, Syria, Arabia, Iran, Pakistan.

subsp. **cassiniana** (Jaub. & Spach) N. Kilian, Willdenowia 25: 277 (1995).

Syns. *Sonchus cassinianus* Jaub. & Spach, Ill. Pl. Orient. 3: 122, f. 280 (1848).

*Zollikoferia cassiniana* (Jaub. & Spach) Boiss., Fl. Orient. 3: 822 (1875).

*Launaea cassiniana* (Jaub. & Spach) Kuntze, Revis. Gen. Pl. 1: 351 (1891).

For more synonyms and notes, see Kilian, pp. 409-410 (1997).

Achenes 3-5(6) x 0.4-0.7 mm; pappus 4-7(9) mm, deciduous, homomorphic, of c. 20-30 setaceous bristles,  $\pm$  equal in length and diameter.

N, O, D, R, GE, S; sandy and stony deserts, alluvial plains, edges of cultivation. Mauritania, Morocco, Algeria, Libya, Egypt, Sudan, Chad, Arabia, Iran.

NOTE: The type of *Leontodon mucronatum* was collected in Cairo, Egypt, "in desertis kahirinis", Forsskål 1401, 1402 (C, isotype S); the type of *Sonchus cassinianus* was collected in Egypt (P).

91. **Reichardia** Roth

Syn. *Picridium* Desf.

Annuals or herbaceous perennials; leaves entire to pinnatisect, the lobes denticulate; peduncle swollen below capitulum; capitula homogamous; phyllaries multi-seriate, imbricate, scarious-margined; receptacle flat, epaleate; ligules yellow, sometimes purplish on the lower surface; anthers with sagittate bases; outer achenes brown, 4-5-ribbed, the ribs tuberculate; inner achenes paler, usually smooth; pappus setae

homomorphic, multiseriate, simple, connate at the base into a ring, caducous. About 8 species, Canary Islands, Europe, Mediterranean region, northeast tropical Africa, southwest Asia, eastwards to India, Socotra, Polynesia, Australia.

1. Annual; scarious margins of phyllaries 1-2 mm broad 1. **R. tingitana**  
+ Perennial; scarious margins of phyllaries 0.2-0.5 mm broad 2. **R. picroides**

1. **Reichardia tingitana** (L.) Roth, Bot. Abh. 35 (1787).

Syns. *Scorzonera tingitana* L., Sp. Pl., ed. 1, 791 (1753).

*Scorzonera orientalis* L., Syst. Nat., ed. 10, 2: 1191 (1759).

*Picridium tingitanum* (L.) Desf., Fl. Atlant. 2: 220 (1799).

*Reichardia tingitana* (L.) Roth var. *arabica* (Hochst. & Steud.) Asch. & Schweinf., Mém. Inst. Egypt. 2: 100 (1887), nom. superfl.

*Reichardia tingitana* (L.) Roth var. *orientalis* (L.) Asch. & Schweinf., Mém. Inst. Egypt. 2: 100 (1887), nom. superfl.

Glaucous glabrescent annual 5-40 cm, papillose-scabrid; stems branched from the base, ascending; leaves 3-15 x 1-4 cm, oblanceolate, rather fleshy, undivided to pinnatisect, the lobes spinose-dentate or -denticulate; cauline leaves sessile, clasping, the basal petiolate; peduncle 1-12 cm, swollen below capitulum, bracteate; capitula 1.8-2.5 cm diam. at anthesis, solitary at ends of the branches; phyllaries 3-4-seriate, all with conspicuous scarious margins 1-2 mm broad, the outer 4-6 x 4-6 mm, broadly ovate to ± orbicular, apex mucronate; middle 0.8-1 x 0.4-0.5 cm, oblong-lanceolate, the inner 1-1.5 x 0.2-0.4 cm, lanceolate; florets c. 2 cm; ligule golden yellow, purplish on the lower surface; corolla-tube slender, hairy in the upper part; achenes tetragonal, 4-sulcate, tuberculate, ± truncate at both ends, the outer 1.5-2.2 x 1 mm, greyish-brown, the inner 2.5-3x1 mm, white, mostly slightly tuberculate; pappus 8-9 mm, of multiseriate simple white soft hairs, connate at the base into a ring, deciduous.

N, M, D, R, GE, S; desert wadis, sandy and alluvial plains, edges of cultivation. Mediterranean region, southwest Asia, eastwards to India, Socotra, tropical East Africa, Australia, Polynesia.

2. **Reichardia picroides** (L.) Roth, Bot. Abh. 35 (1787).

Syns. *Scorzonera picroides* L., Sp. Pl., ed. 1, 792 (1753).

*Sonchus picroides* (L.) Lam., Encycl. 3: 298 (1791).

Like *Reichardia tingitana*, but perennial; phyllaries with scarious margins 0.2-0.5 mm.

? M, ? S; sandy soils. Mediterranean region, southern Europe.

NOTE: The occurrence of this species in Egypt is doubtful, and was most probably based on erroneous identification. The only five specimens (K) from Mariut, Egypt, labelled *Reichardia picroides*, which we have come across, proved to be *Launaea fragilis* subsp. *fragilis*. So far, no authentically identified specimens of *R. picroides*, collected from Egypt, have been traced.

92. **Crepis** L.

Syns. *Askellia* W. A. Weber, *Endoptera* DC., *Lagoseris* M. Bieb.,

*Melitella* Sommier, *Nemauchenes* Cass., *Phaecasium* Cass., *Phalacroderis* DC.,

*Pterotheca* Cass., *Rodigia* Spreng., *Zacintha* Mill.

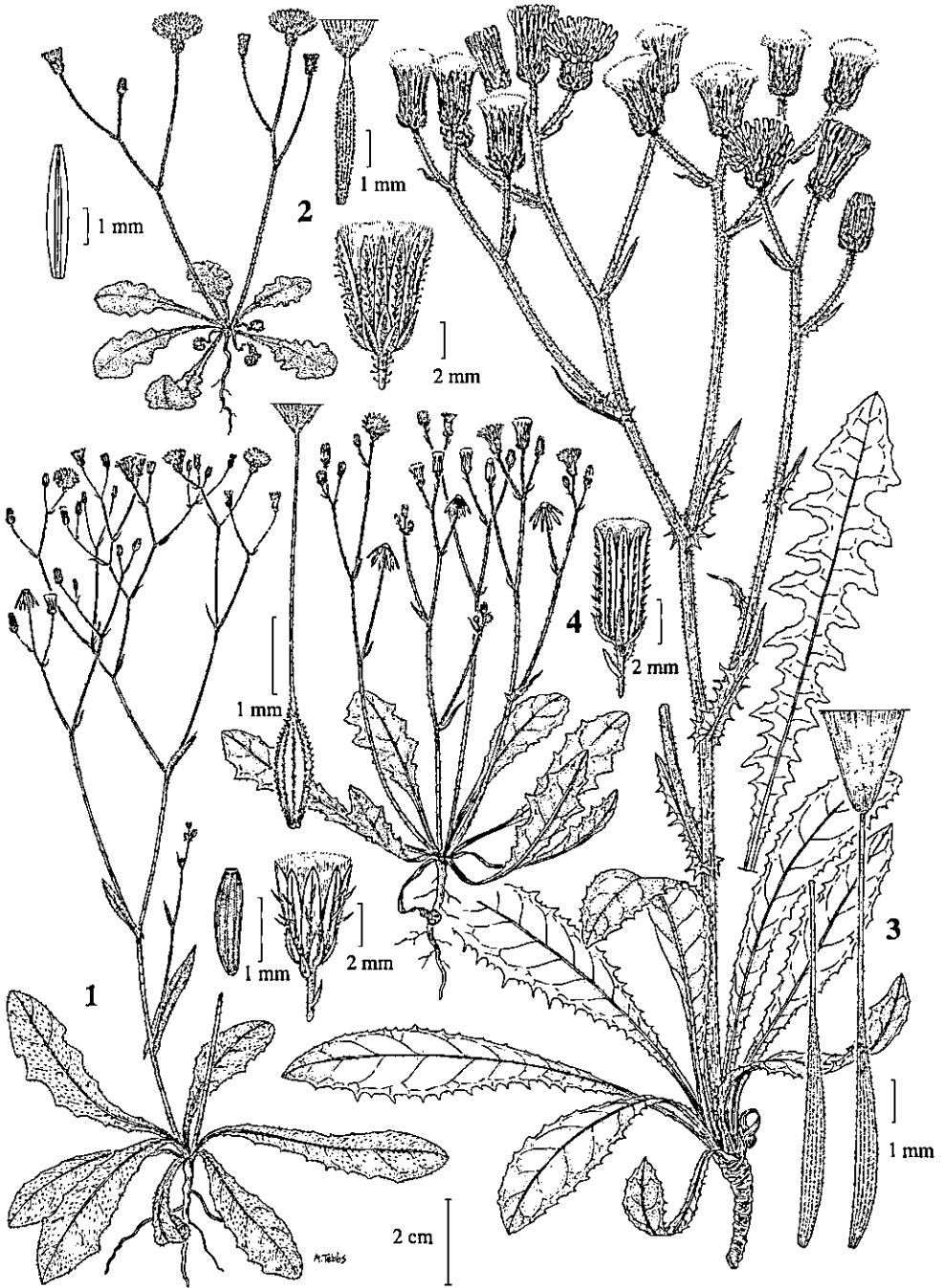
Literature: Babcock, E. B. 1947. The genus *Crepis*, part 2. Univ. Calif. Publ. Bot. 22: 199-1030.

Annuals, biennials or herbaceous perennials, with taproots or rhizomatous; stems leafy or scapiform, branched or unbranched, or plant acaulescent; basal leaves often in a rosette, entire or pinnate, petiolate; peduncle ebracteate; capitula homogamous, few- or many-flowered; phyllaries 2- to multi-seriate, the inner often thickening in fruit, the outer shorter and often forming a calyculus; ligules yellow, rarely pink or white, with 5 apical teeth; anthers sagittate at the base and with a blunt apical appendage; style-branches filiform, divergent; achenes homo- or hetero-morphic, usually cylindrical or fusiform, truncate or attenuate to a beak, ribbed; pappus 1- to multi-seriate, usually white, persistent or caducous, the hairs free or connate at the base, soft, scabridulous or barbellate. About 200 species, mainly northern hemisphere, tropical and South Africa.

- 1. Achenes beakless 2
- + Achenes, all or most, beaked 3
  
- 2. Involucre 4-5 mm; achenes 1.5-1.75 mm, homomorphic; apex truncate 1. *C. micrantha*
- + Involucre 7-9 mm; achenes 3-5 mm, dimorphic, the marginal oblong, truncate, epappose, the inner fusiform, tapering to a truncate apex 2. *C. sancta*
  
- 3. Perennial 4
- + Annual 5
  
- 4. Cauline leaves 3-6 x 0.5-1 cm, lanceolate to oblong-lanceolate, clasping; achenes 0.8-1.2 cm (including the beak), beak 4-7 mm 3. *C. libyca*
- + Cauline leaves much smaller, linear or bract-like; achenes 4.5-6 mm (including the beak), beak 0.5-1.5 mm 4. *C. clausonis*
  
- 5. Achenes homomorphic, all long-beaked; beak 3-4 times as long as the achene body 5. *C. senecioides*
- + Achenes dimorphic, beakless or beaked; beak shorter than or equalling the achene body 6
  
- 6. Marginal achenes 7-8.5 mm, the inner with persistent pappus 8. *C. aculeata*
- + Achenes 4-5 mm, the inner with deciduous pappus 7
  
- 7. Stems and fruiting involucre with sparse yellow bristles 2-4 mm 7. *C. aspera*
- + Stems hispid to glabrescent, without yellow bristles; fruiting involucre with black bristles 6. *C. nigricans*

1. *Crepis micrantha* Czerep in Bobrov & Tzvelev, Fl. SSSR 29: 684 (1964).  
 Syn. *Crepis parviflora* Desf. ex Pers., Syn. Pl. 2: 376 (1807), non Moench (1794).

Hispidulous or glabrescent annual, 15-50 cm; stems erect, slender, branched above the base; basal leaves 4-10(15) x 1-3(5) cm, rosulate, oblanceolate, remotely dentate or runcinate; cauline leaves 2-6(10) x 0.6-2.5 cm, lanceolate to linear-lanceolate, sessile, auriculate, entire or obscurely dentate; inflorescence a lax corymb; peduncle 1-3 cm; capitula numerous; involucre 4-5 x 4 mm; outer phyllaries c. 2 x 1 mm, ovate, acute, the inner 4-5 x 1.5 mm, oblong, narrowly scarious-margined; ligule c. 4 mm, golden yellow; corolla-tube c. 2 mm; achenes 1.5-1.75 x 0.4 mm, homomorphic, subcylindrical, slightly curved or straight, with prominent longitudinal ribs, the apex truncate.



**Plate 73. COMPOSITAE:** *Crepis micrantha* 1, habit; achene and capitulum (middle right). *Crepis sancta* 2, habit; marginal achene (left); inner achene (up right); capitulum (down right). *Crepis libyca* 3, habit; achenes, short and long-beaked (down right). *Crepis senecioides* 4, habit; achene (left); capitulum (right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

N, O, M, S; cultivated and waste ground. East Mediterranean region, eastwards to Iran, adventive in southern France and Canary Islands.

2. **Crepis sancta** (L.) Bornm., Mitt. Thür. Bot. Ver., nov. ser., 30: 79 (1913)  
subsp. **sancta**

Syns. *Hieraceum sanctum* L., Cent. Plant. 2: 30 (1756).

*Lagoseris bifida* (Vis.) Koch, Syn. Fl. Germ. 435 (1837).

*Crepis sancta* (L.) Babco., Univ. Calif. Publ. Bot. 19: 403 (1941).

For full synonymy see Meikle, Fl. Cyprus 2: 1010 (1985).

White-cripsed and glandular-hairy annual, 5-20 cm; stems 1 to several from the base, erect or ascending, slender; leaves 3-6 x 0.6-1.8 cm, rosulate, oblanceolate, hispidulous, remotely dentate; peduncle 0.6-8 cm, slender; capitula solitary at the tips of stems or forked branchlets; involucre 7-9 x 5-3 mm, campanulate, reflected after anthesis; outer phyllaries 2-2.5 x 1 mm, ovate, the margins scarious, the midrib with black hairs; inner 7-9 x 1 mm, oblong-linear, glandular-pilose; ligule 5-6 mm, golden-yellow; corolla-tube 2 mm; achenes 3-5 mm, dimorphic, the marginal 3-4.5 x 0.5-1.5 mm, oblong, truncate, epappose, the inner 3-4 x 0.5 mm, fusiform, longitudinally ribbed, tapering to a truncate apex, not beaked; pappus 3.5-4 mm, of white silky hairs.

De, S; wadi beds, stony ground. East Mediterranean region (naturalized in West Mediterranean), eastwards to northern India and Central Asia.

NOTE: Several subspecies of *Crepis sancta* were recognized by Babcock (1947), the Egyptian material may refer to subsp. *sancta*. According to Feinbrun-Dothan, Fl. Palest. 3: 445 (1978) and Meikle, Fl. Cyprus 2: 1011 (1985), it is difficult to separate some of these infraspecific taxa.

3. **Crepis libyca** (Pamp.) Shab., Min. Agric. Egypt Tech. & Sci. Service Bull. 197 (1938).  
Syns. *Crepis taraxacifolia* Thuill. var. *libyca* Pamp., Nuovo Giorn. Bot. Ital. 24: 158 (1917).

*Crepis vesicaria* L. var. *libyca* (Pamp.) Maire & Weiller, Bull. Soc. Hist. Nat. Afr. Nord 30: 288 (1939).

Glandular-hairy perennial 25-50 cm; stems erect, stout, branched above, deeply sulcate; basal leaves 8-25 x 1.5-4 cm, in a rosette, oblanceolate, attenuate to a petiole, dentate or runcinate, glabrescent or puberulent; cauline leaves 3-6 x 0.5-1.2 cm, lanceolate to oblong-lanceolate, sharply dentate, clasping, the auricles dentate; capitula in open corymbose inflorescences; peduncle 1.2-4 cm, stout, glandular-hairy; involucre 1.2 x 0.8 cm, broadly cylindrical, glandular-hairy; outer phyllaries 3-6 x 2-3 mm, broadly ovate, conspicuously scarious-margined, the inner 1.2-1.4 x 1.5-2 mm, oblong-linear, scarious-margined; ligule c. 1 cm, yellow, corolla-tube c. 4 mm; achenes 0.8-1.2 cm (including the beak), 10-ribbed, antrorsely spinulose on the ribs, the beak 4-7 mm; pappus 7-8 mm, persistent.

M; barley fields. Libya, Egypt (Sollum).

NOTE: Babcock, the genus *Crepis* 2: 822 (1947), cited a single specimen of *Crepis libyca* from Egypt: El-Sellum (Sollum), Wadi El Ramla, Shabetai, in 1934 (UC). The above description of the species is based on material collected from Libya (K).

4. *Crepis clausonis* (Pomel) Batt. & Trab., Fl. Algérie 564 (1888-1890).

Syn. *Barkhausia clausonis* Pomel, Nouv. Mat. Fl. Atlant. 4 (1874).

Perennial 10-30 cm; root woody; stems branched, decumbent, glandular-hairy to glabrescent; basal leaves 8-15 x 1.5-3 cm, oblanceolate, attenuate to a long winged petiole, denticulate or sinuately dentate, glabrous or finely pubescent; cauline leaves small, linear or bract-like; capitula c. 100-flowered, in lax subcorymbose inflorescence; peduncle 1.5-12 cm, often glandular-pubescent; involucre 1-1.2 x 0.6-0.8 cm, campanulate, finely glandular-pubescent; outer phyllaries 3-4 mm, oblong-lanceolate, acute, margin narrowly scarious, the inner 1-1.2 cm, lanceolate, acute, scarious-margined; receptacle densely ciliate; ligule 8 mm; corolla-tube 3 mm, pubescent; achenes 4.5-6 mm including the beak, fusiform, attenuate to a beak 0.5-1.5 mm; pappus 4-6 mm, 2-seriate, of soft white hairs, deciduous.

M; barley fields. Algeria, Tunisia, Egypt (Marmarica).

NOTE: We were unable to examine any material of this species from Egypt or elsewhere, and the above description is based on Babcock, the genus *Crepis* 2: 804-807 (1947). The occurrence of *Crepis clausonis* in Egypt, according to Babcock, *l.c.*, is based on a single collection by Letourneux in 1870 from Upper Egypt (most probably from Mariut). He also cited one collection from Ain Drahem, Tunisia, and several from Algeria. Battandier & Trabut, Fl. Analyt. Synopt. Algérie et Tunisie, p. 216 (1904) reported the species from Algeria and Tunisia, while Quézel, Nouv. Fl. Algérie 2: 1080-1081 referred to the species as endemic to Algeria.

5. *Crepis senecioides* Delile, Descr. Egypte, Hist. Nat. 118, t. 42, f. 2 (1814).

Syns. *Crepis radicata* sensu auct., non Forssk. (1775).

*Crepis nudiflora* Viv., Fl. Libyc. Spec. 51, t. 13, f. 2 (1824).

*Barkhausia senecioides* (Delile) Spreng., Syst. Veg., ed. 16, 3: 652 (1826).

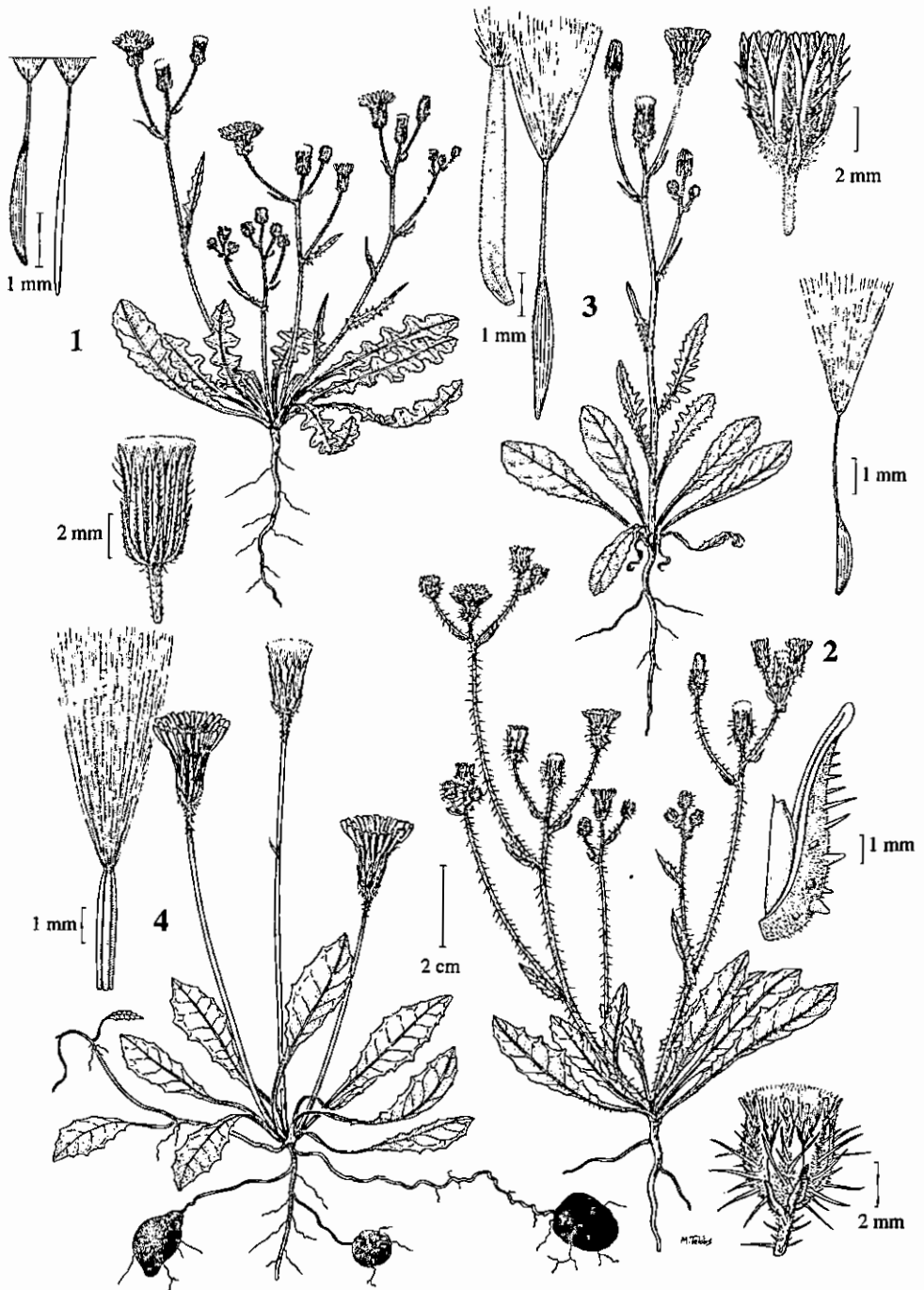
*Psammoseris arabica* Boiss. & Heldr. in Boiss., Diagn. Pl. Orient., ser. 2, 11: 52 (1849).

*Crepis radicata* Forssk. var. *arabica* (Boiss.) Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 31 (1974).

White-crisped glandular-hairy annual, 5-20 cm; stems usually numerous from the base, branched; basal leaves 2-11 x 0.5-2.5 cm, in a rosette, oblanceolate, deeply dentate to pinnatifid, tapering to a winged petiole; cauline leaves much smaller, remotely dentate, sessile, clasping, or bract-like and linear; peduncle 0.5-4.5 cm; capitula 20-40-flowered; involucre 6-9 x 2-3 mm in fruit, with black triangular bristles along the midribs of the outer and inner phyllaries; outer phyllaries 8, 1.2-2.5 x 0.2-0.5 mm (1/4 as long as the inner), linear, the inner 8, 6-9 x 1.5-2 mm, linear-lanceolate, scarious-margined; receptacle ciliate or glabrescent; ligule 3.5-6 mm, pale yellow; corolla-tube 1.2-2.2 mm, pubescent; achenes 5-7.5 mm, including the beak, homomorphic; achene body 1-1.8 x 0.5 mm, compressed, 10-ribbed; beak 3.5-5.5 mm, 3-4 times as long as the achene body, capillary; pappus 1.5-3 mm, 2-3-seriate, of fine white hairs, deciduous.

N, M, D, S; sandy and alluvial soils, desert wadis. Tunisia, Libya, Egypt, Palestine, Arabia.

NOTE: The type of *Crepis senecioides* was collected by Delile near Cairo, Egypt (fide Babcock, p. 912, 1947). This species has been confused with *Crepis radicata*, e.g.



**Plate 74. COMPOSITAE:** *Crepis nigricans* 1, habit; capitulum (down left); marginal achene (thicker) and inner achene (up left). *Crepis aspera* 2, habit; capitulum (down right); marginal achene enclosed in the inner phyllary (middle right); inner achene (up right). *Crepis aculeata* 3, habit; capitulum (right); marginal (beakless) and inner (beaked) achenes (left). *Aetheorhiza bulbosa* 4, habit; achene (left). all drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.



Muschler (1912) and Täckholm (1974), but actually *Crepis radicata* Forssk. is a synonym of *Picris asplenioides* L.

6. *Crepis nigricans* Viv., Fl. Libyc. Spec. 51, t. 10, f. 3 (1824).

Like *Crepis senecioides*, but inner phyllaries 12-14; outer phyllaries  $\frac{1}{2}$  as long as the inner; achenes 3.5-5 mm, dimorphic; marginal achenes shorter than the inner, with a coarse beak  $\pm$  as long as the body of the achene; inner achenes attenuate to a fine beak  $\frac{1}{3}$ - $\frac{1}{2}$  the length of the whole achene.

N (Abu Rawwash); weed of cultivation. Tunisia, Libya, Egypt.

NOTE: The occurrence of this species in Egypt is based on one collection from a lupin field, Abu Rawwash, near the Giza Pyramids, Ascherson 185 (B).

7. *Crepis aspera* L., Sp. Pl., ed. 2, 1132 (1763) var. *aspera*

Annual 10-40 cm; stems erect or ascending, usually branched from the base, with sparse yellow bristles 2-4 mm; basal leaves 2-6(8) x 0.4-1.2 cm, narrowly oblanceolate, irregularly dentate, tapering to a petiole; cauline leaves much smaller, sessile, clasping; peduncle 0.5-3 cm, indurate in fruit; capitula in lax corymbose inflorescences; involucre 6-8 x 3-4.5 mm, constricted above the middle in fruit; outer phyllaries 1-1.5 x 0.5 mm, membranous, the inner 7-8, lanceolate with bulbous-based yellow bristles at the midribs, conspicuously indurate in fruit and enclosing the marginal achenes; receptacle densely ciliate; ligule 7-9 x 1.5 mm, yellow; corolla-tube 2.5-3 mm, hairy; achenes 5-7 mm, dimorphic; marginal achenes 5-6 mm, enclosed within the inner phyllaries, strongly compressed, attenuate to a narrow apex, not beaked, the pappus very short and deciduous; inner achenes 4-7 mm including the beak, 10-ribbed, fusiform, the beak 2.5-3 mm; pappus 3-4 mm, 1-2-seriate, of soft white hairs, deciduous.

De, S; desert wadis and sandy plains. Egypt, Palestine, Syria, Cyprus, adventive elsewhere.

NOTE: Babcock, *op. cit.*, pp. 878-882, described *Crepis aspera* as "a definitely polymorphic species" which grows in diverse habitats in the East Mediterranean region. This has led some authors to describe several varieties of this species. Feinbrun-Dothan, p. 447 (1978) recognizes three varieties, of which var. *aspera* seem to match the Egyptian plants.

8. *Crepis aculeata* (DC.) Boiss., Fl. Orient. 3: 856 (1875).

Syn. *Barkhausia aculeata* DC., Prodr. 7(1): 159 (1838).

Canescent-tomentose to glabrescent annual, 10-35 cm; stems erect or ascending, branched above; basal leaves 1.5-5(8) x 0.3-1.2(2) cm, oblong-lanceolate, dentate to pinnatifid, petiolate; lower cauline leaves pectinately lobed, the lobes oblong-linear, remote, the terminal lobe long; upper leaves bract-like, linear, sessile, clasping; peduncle 1-6(-8) cm, indurate in fruit; involucre 0.9-1.1 x 0.4-0.6 cm, cylindrical, canescent-tomentose, indurate in fruit; outer phyllaries 5, 1-2.5 x 0.5-1 mm, the inner 8-10, 0.9-1.1 x 0.15-0.2 cm, linear-lanceolate, scarious-margined, with a row of strong bristles along the midrib which becomes prickly in fruit; ligule 7-8 mm, yellow; corolla-tube 3-4 mm, pubescent; achenes dimorphic, the marginal 7-8 x 1 mm, slightly compressed, tapering

towards the apex but beakless, pubescent; pappus short and irregular; inner achenes 3-3.5 x 0.5 mm, fusiform, glabrous, striate, beaked; beak  $\pm$  as long as the achene body; pappus c. 4 mm, persistent.

S (Rafah); sandy soils. Sinai, Palestine, Syria, Cyprus.

### 93. *Aetheorhiza* Cass.

Stoloniferous perennial herbs; stems creeping and rooting at the nodes; roots bearing small subglobose tubers; leaves entire, dentate or pinnatifid; inflorescence scapiform, usually with solitary capitula; involucre narrowly campanulate; phyllaries imbricate, 3-4-seriate; ligules yellow, often flushed reddish externally; anthers sagittate at the base; style-branches filiform; receptacle flat, naked; achenes fusiform, 4-ribbed, beakless; pappus copious, white, of smooth or scabridulous hairs, persistent. 1 species, Mediterranean region, coastal areas of southwest Europe.

1. *Aetheorhiza bulbosa* (L.) Cass., Dict. Sci. Nat. 48: 425 (1827).

Syns. *Leontodon bulbosus* L., Sp. Pl., ed. 1, 798 (1753).

*Crepis bulbosa* (L.) Tausch, Flora 11, Erg.-Bl. 1: 78 (1828).

Perennial, with creeping slender stolons rooting at the nodes; roots bearing subglobose tubers 0.5-1.5 cm diam.; leaves 4-12 x 0.6-2.5 cm, in a loose rosette, oblanceolate, dentate or  $\pm$  entire, glabrous, the apex acute, the base tapering to a petiole; scape 5-25 cm, unbranched, with a solitary capitulum, black glandular-hairy above; involucre 1.1-1.4 x 0.6-1 cm, narrowly campanulate; phyllaries imbricate, 3-4-seriate, black glandular-hairy at the base; outer 4-6 x 1-1.5 mm, oblong-lanceolate, the inner 1.1-1.4 x 1.5-2 mm, oblong-linear, scarious-margined, the apex acute and ciliolate; ligule 1-1.2 x 0.15 cm; corolla-tube 6 mm, slender, hairy; achenes 3-3.5 x 0.5 mm, sub-cylindrical, 4-ribbed, minutely scabridulous, brown slightly attenuate towards the blunt apex; pappus 7-8 mm, of white soft hairs.

M, O (Siwa); coastal dunes, moist ground around springs. Distribution as for the genus.

### 94. *Heteroderis* (Bunge) Boiss.

Literature: Léonard, J. 1983. Contribution à la connaissance de la flore de l'Iran. Compositae:

*Heteroderis*, *Scorzonera*, *Taraxacum*. Bull. Jard. Bot. Nat. Belg. 53: 437-440.

Annuals; leaves mostly rosulate, dentate-pinnatifid; capitula few, subcorymbose, at the summit of branches,  $\pm$  pendent; phyllaries distinctly 2-seriate, the outer short scarious-margined, the inner long, hispid; florets yellow; achenes dimorphic; marginal achenes narrowly terete-fusiform, thickly 5- to 6-ribbed, not beaked; inner achenes distinctly divided into main body and beak, the body terete to narrowly obovoid, many-ribbed, the ribs conspicuously and transversely squamose-muricate especially towards the apex; beak long, filiform, deciduous; pappus of many, fine white, scabridulous bristles. 1 species, Egypt, Arabia, Iraq, Iran, Afghanistan, Pakistan, Central Asia.

1. *Heteroderis pusilla* (Boiss.) Boiss., Fl. Orient. 3: 794 (1875) var. *leucocephala* (Bunge) Rech. f., Fl. Iranica 122: 291 (1977).

Syns. *Barkhausia leucocephala* Bunge, Rel. Lehm. 208 (1851).

*Heteroderis stocksiana* Boiss., Fl. Orient. 3: 794 (1875).

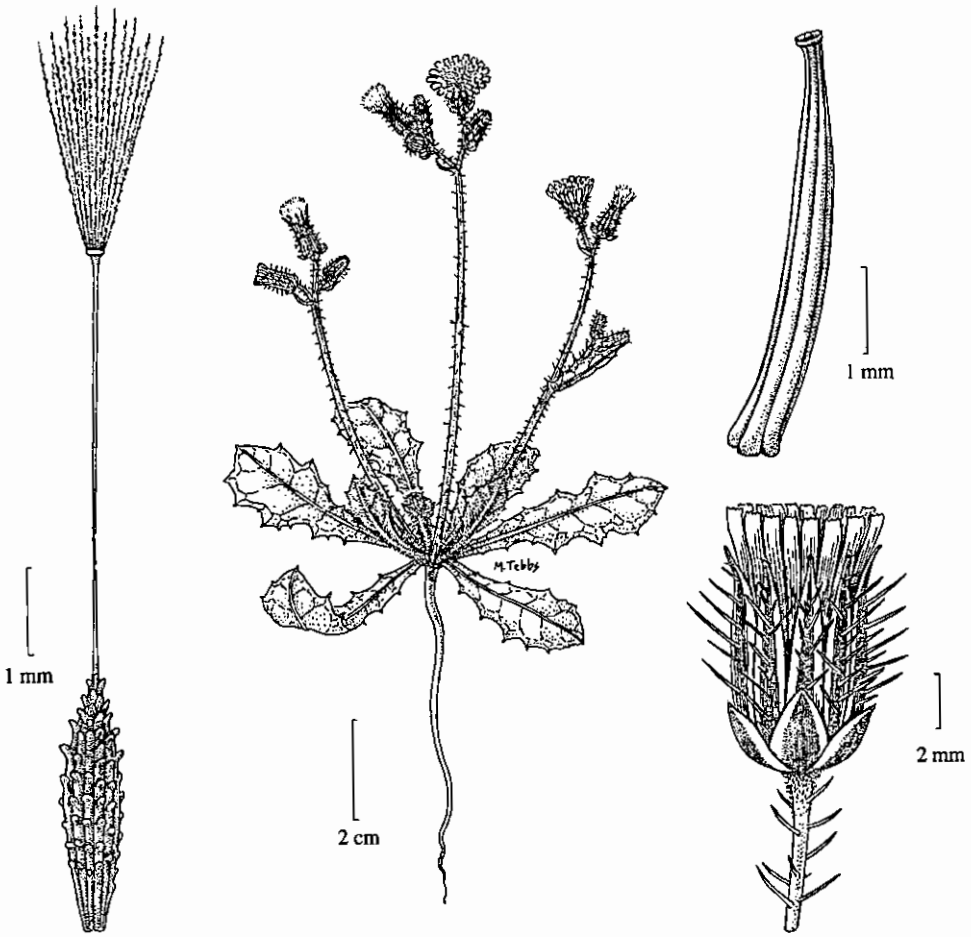


Plate 75. COMPOSITAE: *Heteroderis pusilla* var. *leucocephala*, habit; flowering capitulum (down right); marginal achene (up right); inner achene (left). Drawn by Margaret Tebbs.

*Heteroderis aegyptiaca* Schweinf. in Asch. & Schweinf., Mém. Inst. Egypt. 2, Suppl. 766 (1889).  
*Heteroderis leucocephala* (Bunge) Leonova, Fl. USSR 29: 590 (1964).  
*Crepis aegyptiaca* (Schweinf.) Täckh. & Boulos, Publ. Cairo Univ. Herb. 5: 31 (1974).

Delicate annual 3-12 cm; stems erect, ascending or decumbent, usually branched, sulcate, sparsely white-setulose; leaves 1-6 x 0.4-2 cm, the basal rosulate, oblong-lanceolate, attenuate to a winged petiole, sinuate-dentate to -lobate, remotely denticulate, the teeth callose; juvenile leaves cobwebby but later glabrous, except on the setulose veins beneath; cauline leaves few, smaller, oblanceolate, sessile, clasping; capitula few, at the tips of stems, subcorymbose, 15-20-flowered; peduncle 0.2-1.5 cm, filiform, nodding, sparsely setulose, with shorter crisped hairs; involucre 5-7 x 3-4 mm, cylindrical; phyllaries 2-seriate, the outer *c.* 1.5 x 1 mm, broadly ovate to suborbicular, obtuse, broadly scarious-margined, glabrous, forming a spreading calyculus in fruit; inner phyllaries 5-7 x 1-1.2 mm, oblong-linear, obtuse, scarious-margined, densely setulose, elongate to 0.8-1 cm in fruit; florets 8-9 mm, yellow, purple beneath; achenes dimorphic: marginal achenes 5 x 0.6 mm, narrowly terete-fusiform, thickly 5- to 6-ribbed,  $\pm$  smooth, the base truncate, shortly attenuate towards the apex, not beaked, the apex with a very short discoid corona, pappus *c.* 2 mm, of a few highly deciduous scabrid bristles; inner achenes 8-9.5 mm including the beak; achene body *c.* 2.6 x 0.6 mm, distinctly divided from the beak, narrowly obovoid, *c.* 10-ribbed, the ribs conspicuously and transversely squamose-muricate especially towards the apex; beak *c.* 5.5 mm, filiform, ending with a short cupule, deciduous; pappus 3-3.5 mm, of numerous white scabrid bristles, persistent on the beak.

De (North and South Galala); stony wadis. Egypt, Saudi Arabia, Iran, Afghanistan, Pakistan.

NOTE: The type of *Heteroderis aegyptiaca* was collected from "Wadi Qorn Kabsch, südliche Galala, östl. Wüste, 7.5.1887, 1200 m", Schweinfurth *s.n.* (K!). This species, which resembles in its general appearance *Launaea capitata*, was later transferred to the genus *Crepis* as *Crepis aegyptiaca* by Täckholm & Boulos (1974) and was considered endemic to Egypt by Täckholm (1974) and Boulos (1995). However, Léonard (1983) found that our taxon is a *Heteroderis* species, as Schweinfurth had correctly shown, but the Egyptian plants belong to *Heteroderis pusilla*, with four varieties of which our plants belong to var. *leucocephala*, of wide geographical distribution, extending from the Eastern Desert of Egypt to Arabia, eastwards to Pakistan.

## 95. *Sonchus* L.

Literature: Boulos, L. 1973. Révision systématique du genre *Sonchus* L. *s.l.* IV. Sous-genre 1. *Sonchus*. Bot. Notiser 126: 155-196.

Annual, biennial or perennial herbs, sometimes woody at the base (our species), or shrubs; leaves denticulate to pinnatisect, often spiny, the cauline amplexicaul; capitula few to numerous, 80-300 flowered; involucre conical after anthesis; phyllaries in 3 to several imbricate series; receptacle epaleate; ligule yellow; achenes slightly to strongly compressed, narrowed at both ends, with 1-4 ribs on each face, erostrate (beakless); pappus of deciduous setaceous bristles, and  $\pm$  persistent soft hairs in fascicles. 54 species, Old World, many endemic to the Macaronesian Islands, a few introduced and naturalized in the the New World, 1 cosmopolitan weed.

1. Plant with a creeping rhizome; leaves  $\pm$  linear, entire or denticulate 1. **S. maritimus**  
+ Plant with a taproot; leaves variously lobed 2
2. Achenes strongly compressed, winged, not rugose or tuberculate 3  
+ Achenes compressed, wingless, rugose or tuberculate, at least between the ribs 5
3. Leaf-lobes usually retrorse; corolla-tube c. 8 mm; achenes 4-5.5 x 1.5-1.75 mm,  
margins and ribs smooth, never spinulose 5. **S. macrocarpus**  
+ Leaf-lobes usually straight; corolla tube c. 6 mm; achenes 2-3.5 x 1-1.25 mm,  
margins and the ribs with recurved spinules 4
4. Annual, leaves mostly cauline, rather thin; achenes with sparse  
spinules on the margins and ribs 4. **S. asper** subsp. **asper**  
+ Biennial; leaves mostly in a basal rosette, coriaceous; achenes with  
dense recurved spinules on the margins and ribs 4. **S. asper** subsp. **glaucescens**
5. Leaf-lobes strongly constricted at the base, or narrowly linear,  
terminal lobe usually as large as the laterals; ligule longer than the corolla-tube;  
achenes tapering to a very narrow base 3. **S. tenerrimus**  
+ Leaf-lobes not or slightly constricted at the base, terminal lobe usually  
much larger than the laterals; ligules  $\pm$  as long as the corolla-tube;  
achenes gradually narrowed at the base 2. **S. oleraceus**

1. **Sonchus maritimus** L., Syst. Nat., ed. 10, 2: 1192 (1759).

Syns. *Sonchus angustifolius* Neck., Delic. Gallo-Belg. 2: 326 (1768).

*Sonchus aquatilis* Pourr., Mém. Acad. Toul. 3: 330 (1788).

For more synonyms see Boulos, p. 174 (1973).

Herbaceous perennial 15-60 cm, with a creeping rhizome; stems simple or sparsely branched above, glabrous or white-tomentose above; leaves 5-20 x 0.4-1.8 cm, subresolate, linear-lanceolate to oblong-linear, the margins entire, denticulate, remotely dentate, or pinnatifid, glabrescent, sessile, auriculate, with a prominent midrib; cauline leaves much smaller, narrowly lanceolate to linear; capitula few; base of capitula and upper part of peduncles often white-tomentose, eglandular; peduncle 1-10 cm; florets 80-150 per capitulum; involucre 1-1.2 x 0.6-0.8 cm, campanulate, 3-4-seriate, of 25-28 phyllaries; outer phyllaries 3-6 x 1-2 mm, narrowly lanceolate, obtuse, the inner 1-1.2 x 0.2 cm, narrowly scarious-margined, subacute; ligule 1-1.2 x 0.2 cm, lemon-yellow; corolla-tube c. 6 mm; anthers 3 x 0.4 mm; achenes 2.25-3 x 0.75-1.5 mm, yellowish, oblong-ellipsoid, compressed, more attenuate towards the base, weakly rugose between the ribs or smooth, with wide margin; pappus 5.5-8.5 mm, deciduous.

O, De (Suez Canal region); irrigation canals, moist ground near springs. Southwest Europe, southern Russia, Mediterranean region, eastwards to Pakistan, southern Africa, Australia.

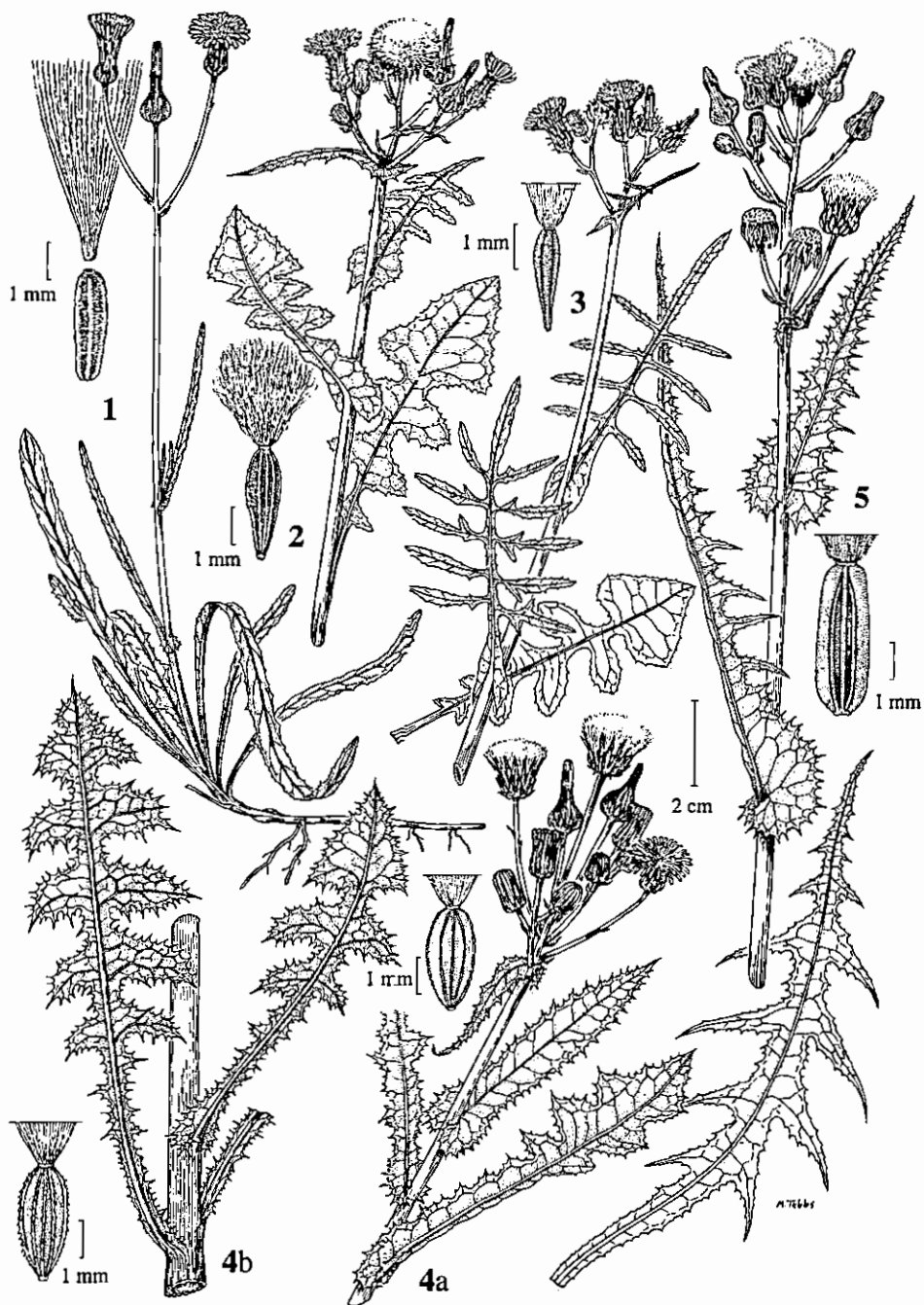
2. **Sonchus oleraceus** L., Sp. Pl., ed. 1, 794 (1753).

Syns. *Sonchus ciliatus* Lam., Fl. Fr. 2: 87 (1778).

*Sonchus glaber* Gilib., Fl. Lit. Inch. 1: 242 (1781).

*Sonchus lacerus* Willd., Sp. Pl., ed. 4, 3: 1513 (1803).

For more synonyms see Boulos, pp. 155-156 (1973).



**Plate 76. COMPOSITAE:** *Sonchus maritimus* 1, habit; achene (left). *Sonchus oleraceus* 2, flowering and fruiting branch; achene (down left). *Sonchus tenerrimus* 3, flowering and fruiting branch, and leaf variation; achene (up left). *Sonchus asper* subsp. *asper* 4a, flowering and fruiting branch; achene (up left). *Sonchus asper* subsp. *glaucescens* 4b, lower cauline leaves; achene (down left). *Sonchus macrocarpus* 5, flowering and fruiting branch; middle cauline leaf (down); achene (right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

Glabrescent annual 10-80 cm, often glandular-hairy above; stems simple or branched, sometimes white-tomentose at the base of capitula and on upper part of peduncles; leaves 8-20 x 3-10 cm, very variable; lower leaves undivided, with narrow winged petiole; cauline leaves larger, pinnatifid to pinnatisect, lyrate or sometimes runcinate, auriculate, the lobes of variable shape, not or slightly constricted at the base, the terminal lobe usually much larger than the laterals, the margins spinulose-dentate; capitula usually numerous, in subcorymbose inflorescences; peduncle 0.5-6.5 cm; florets 80-230 per capitulum; involucre campanulate, becoming conical after anthesis, of 27-35 phyllaries, 3-4-seriate; outer phyllaries 2.5-7 x 1-2.5 mm, lanceolate, obtuse, glabrous or glandular-hairy at the midrib, hardly scarious-margined, the inner 0.8-1.2 x 0.15-0.3 cm, narrowly lanceolate, obtuse, scarious-margined, usually glabrous; ligule c. 6 mm, yellow; corolla-tube  $\pm$  as long as the ligule; achenes 2.5-3.5 x 0.75-1 mm, compressed, oblanceolate, gradually narrowed at the base, 2-4-ribbed, rugose between the ribs; marginal achenes greenish- yellow or yellowish-brown, the inner darker and less rugose; pappus 5.5-8 mm,  $\pm$  persistent.

N, O, M, D, R, S; weed of cultivation, waste ground, roadsides, desert wadis and plains. Cosmopolitan.

NOTE: *Sonchus oleraceus* is a polymorphic species which grows in diverse habitats. Its variability might be due to its probable allopolyploid origin ( $2n=32$ ), as a hybrid between *S. asper* ( $2n=18$ ) and *S. tenerrimus* ( $2n=14$ ).

### 3. *Sonchus tenerrimus* L., Sp. Pl., ed. 1, 794 (1753).

Like *Sonchus oleraceus*, but leaf-lobes strongly constricted at the base, or narrowly linear, terminal lobes usually as large as the laterals; ligule longer than the corolla-tube; achenes tapering to a very narrow base.  $2n=14$  (the lowest somatic chromosome number in the genus *Sonchus*).

M; hillsides and sheltered crevices. Macaronesian Islands, southwestern Europe, Mediterranean region eastwards to Pakistan, Armenia, Ethiopia, Sudan, southern Africa, probably naturalized in Mexico (Cedros Island), California, South Australia and New Zealand.

NOTE: *Sonchus tenerrimus* is known in annual, biennial and perennial variants. In Egypt only the annual variant is known; the species is very rare in Egypt, only three collections are known to us from the western Mediterranean coastal region: Bahig (west of Alexandria), Agiba, west of Mersa Matruh, 4 March 2002, Boulos 19780 (Herb. Boulos, Cairo), and Sollum, near the frontier with Libya, 10 April 2000, Boulos 19289 (Herb. Boulos, Cairo).

### 4. *Sonchus asper* (L.) Hill, Herb. Brit. 1: 47, t. 34, f. 2 (1769).

Syn. *Sonchus oleraceus* L. var. *asper* L., Sp. Pl., ed. 1, 794 (1753).

Glabrescent annual or biennial, 10-80 cm, often glandular-hairy above; stems simple or branched; leaves 5-18 x 3-8 cm, variable, basal and cauline, or  $\pm$  rosulate, thin or coriaceous, entire to pinnatisect, the lobes deltoid, ovate or linear; cauline leaves auriculate, the auricles rounded, the margin dentate-spinulose; capitula usually numerous, in corymbose or umbellate inflorescences; peduncle 0.5-2.5 cm, elongate to 5 cm in fruit; florets 80-300 per capitulum; involucre campanulate, of  $\pm$  40 phyllaries,

3-4-seriate; outer phyllaries 2-5 x 1-1.5 mm, lanceolate, glabrous or glandular along the midrib, the inner 0.8-1.2 x 0.1-0.25 cm, oblong-linear, acuminate, scarious-margined; ligule c. 4 mm, yellow; corolla-tube c. 6 mm; anthers 3 mm; achenes 2-3 x 1-1.2 mm, strongly compressed,  $\pm$  elliptic, with 3 prominent ribs on both surfaces, the margins broad, with sparse to dense retrorse spinules on the ribs and margins; pappus 8-9 mm, white-cottony, deciduous; pollen 30-42  $\mu$ .

Two subspecies occur in Egypt:

subsp. **asper**

Annual; leaves mostly cauline, rather thir., finely spinulose along the margins; achenes with sparse spinules on the margin and ribs; pollen 35-42  $\mu$ .

N, O, M, S; weed of cultivation, waste ground, irrigation canals. Temperate and cool temperate regions of the world.

subsp. **glaucescens** (Jord.) Ball, J. Linn. Soc. 16: 548 (1878).

Syn. *Sonchus glaucescens* Jord., Obs. Pl. Crit, 5: 75, t. 5 (1847).

Biennial; leaves mostly in a basal rosette, coriaceous, rigidly spinulose along the margins; achenes with dense recurved spinules on the margin and ribs; pollen 30-35  $\mu$ .

N, O; edges of cultivated ground, canal banks. Atlantic Islands, Mediterranean region eastwards to Afghanistan, southern Africa, Australia; probably introduced elsewhere.

5. ***Sonchus macrocarpus*** Boulos & C. Jeffrey, Taxon 18: 349 (1969).

Syn. *Sonchus gigas* Boulos, Bot. Notiser 112: 365 (1959), nom. non rite publ., non Boulos ex Humbert (1963).

Glabrescent annual or short-lived perennial, 0.2-1.2 m; taproot much-branched, often woody in the upper part; stems angled, sulcate, usually branched; leaves 10-50 x 3-20 cm, pinnatifid to pinnatisect, auriculate; auricles conspicuous, rounded and spinose-dentate; leaf-lobes narrowly to broadly triangular, usually retrorse, irregularly spinose-dentate, acuminate-mucronate; uppermost leaves smaller, clasping; capitula usually numerous, in corymbose inflorescences; young capitula subglobose, later cylindrical, becoming conical after anthesis; peduncle 1-3.5 cm; florets 180-240 per capitulum; involucre of  $\pm$  30 phyllaries, 3-4-seriate; outer phyllaries 2-6 x 2 mm, lanceolate, narrowly scarious-margined, obtuse, the inner 1-1.2 x 2-3 mm, oblong-lanceolate, broadly scarious-margined, obtuse; ligule 4-5 mm, yellow; corolla-tube c. 8 mm; achenes 4-5.5 x 1.5-1.75 mm, oblong-elliptic, compressed, brown, with broad margin and 3 median ribs on both surfaces, smooth, never spinulose on the ribs and margin; pappus c. 8 mm, of soft white hairs,  $\pm$  deciduous.

N ( $\delta$ ), M (Alexandria), De (along canals east of the Nile delta); canal banks, moist ground. Endemic.

NOTE: The holotype of *Sonchus macrocarpus* was collected in Egypt, agricultural road between Kafr El-Sheikh and Disuq on Faraoun Drain, 24 April 1958, Boulos *s.n.* (CAI!).



## 96. *Lactuca* L.

Annual, biennial or perennial herbs, with tap roots; leaves alternate, subentire, dentate or pinnatisect, auriculate or decurrent, often spinulose; capitula homogamous, ligulate, often small; involucre cylindrical; phyllaries imbricate, in 3-4 series; receptacle naked; corolla yellow, blue or rarely white; anthers sagittate at the base, style-branches filiform; achenes flattened, usually many-ribbed, with a long slender beak; pappus of many fine white or yellowish, smooth or scabridulous bristles. About 75 species, worldwide, especially north temperate regions.

1. Achenes 1-ribbed on each face,  
transversely rugulose (small desert annual) 1. *L. undulata*
- + Achenes 5-9-striate on each face, not rugulose (weeds) 2
2. Leaf-midrib smooth on the lower surface; capitula in narrow  
elongate spiciform inflorescences 2. *L. saligna*
- + Leaf-midrib spinulose on the lower surface; capitula in lax  
paniculate inflorescences 3. *L. serriola*

1. *Lactuca undulata* Ledeb., Icones Pl. Fl. Ross. 2: t. 129 (1830).

Glabrescent annual 10-25 cm; stems erect, simple or branched from the base, setulose; leaves 2.5-6 x 0.5-1.5 cm, elliptic, the basal undivided and tapering at the base to a winged petiole; cauline leaves pinnatisect, sessile, auriculate, the uppermost lanceolate, ± entire; peduncle 2-6 mm, bracteate; capitula 8-12-flowered, in cymose inflorescences; involucre 0.8-1.1 cm, elongate to *c.* 2 cm in fruit, 3-4-seriate; phyllaries *c.* 12, all narrowly scarious-margined, purple-tipped; the outer 2-3 x 1-1.2 mm, lanceolate, the inner 0.8-1.1 x 0.1-0.12 cm, oblong-linear, becoming linear and to 2 cm in fruit; ligules pinkish or bluish; achenes 1.3-1.5 cm, including the beak; body of the achene 3-3.5 x 1 mm, obovate, thin, narrowly margined, 1-ribbed on each face, transversely rugulose; beak 1-1.2 cm; pappus *c.* 4 mm, of fine hairs, yellowish-white, persistent.

S; stony desert wadis. East Mediterranean region, Sinai, eastwards to Pakistan, Transcaucasus, Central Asia, western China.

2. *Lactuca saligna* L., Sp. Pl., ed. 1, 796 (1753).

Glabrous annual or biennial, 20-60(80) cm; stems simple or branched from near the base, erect or ascending; leaves 1.5-8 x 0.5-3.5 cm; lower leaves oblanceolate, runcinate-pinnatifid, the lobes deltoid, acute, the base tapering to a winged petiole; cauline leaves sessile, the base sagittate; upper leaves small, linear, sessile, auriculate; peduncle 0.2-2 cm, bracteate; capitula 8-14-flowered, solitary or few, in clusters along a narrow elongate spiciform inflorescence; involucre 0.5-1.2 cm, narrowly cylindrical, elongate to *c.* 2 cm in fruit; phyllaries *c.* 10, 3-seriate, glabrous, scarious-margined, often purple-tipped; outer phyllaries 3-5 x 1-1.5 mm, oblong-lanceolate, obtuse, the inner 1-1.2 x 0.1 cm, linear, subacute; ligule pale yellow, often drying blue; achenes 8-10.5 mm including the beak; achene body *c.* 3 x 1 mm, narrowly oblong-elliptic, the apex acute, strongly compressed, with 7-8 longitudinal ribs on each face, brown; beak 5-6.5 mm; pappus *c.* 5 mm, of white silky hairs.

N, M, De, S; roadsides, waste ground, edges of cultivation. Europe, Caucasus, Mediterranean region, Sinai.

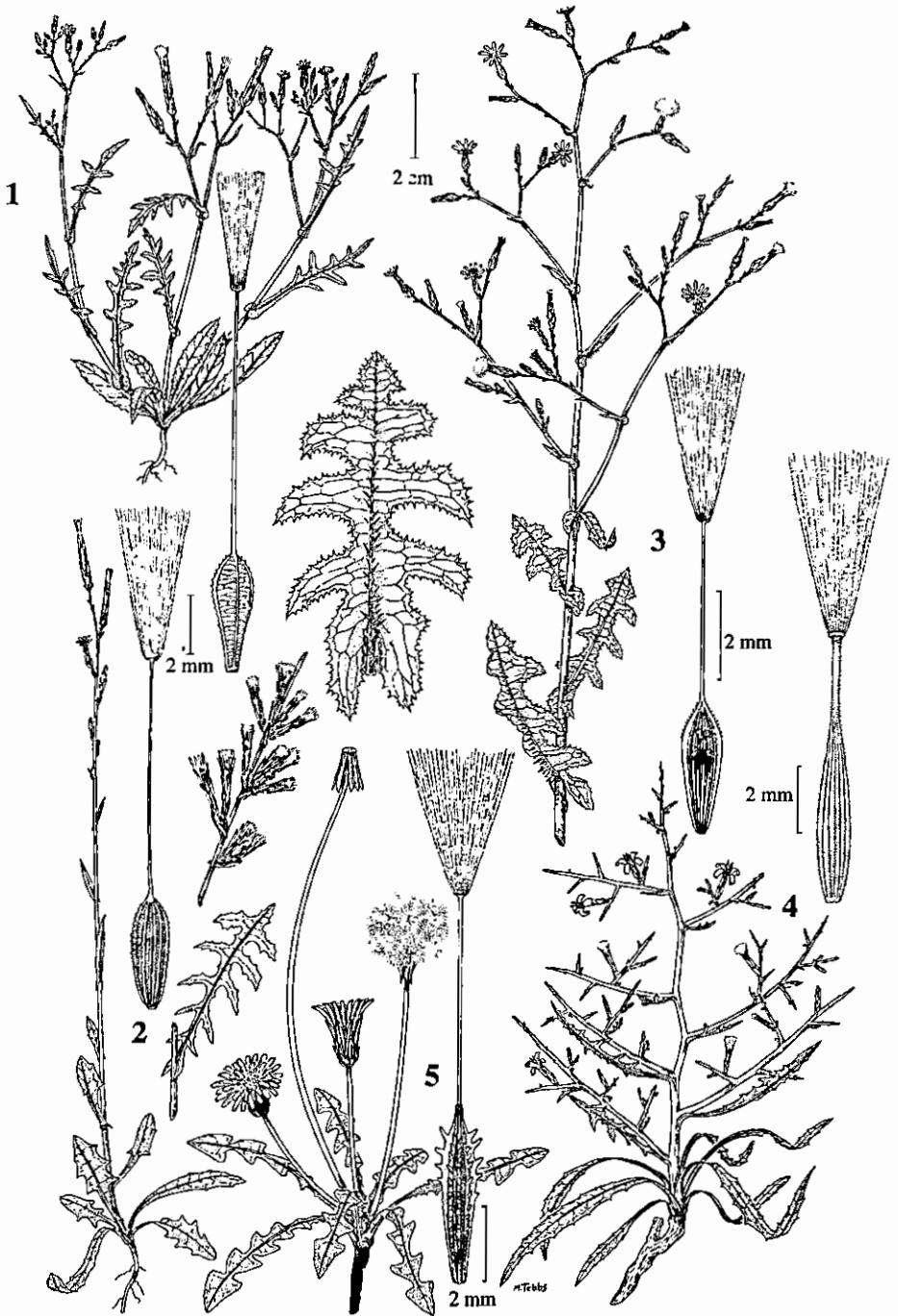


Plate 77. COMPOSITAE: *Lactuca undulata* 1, habit; achene (down right). *Lactuca saligna* 2, habit of a young flowering and fruiting plant; achene (right); part of a fruiting inflorescence (further right); cauline leaf (down right). *Lactuca serriola* 3, flowering and fruiting branch; cauline leaf (left); achene (down right). *Scariola orientalis* 4, habit; achene (up right). *Taraxacum minimum* 5, habit; achene (right). All drawings to the same scale, except the enlarged parts (scale given). Drawn by Margaret Tebbs.

3. *Lactuca serriola* L., Cent. Pl. 2: 29, no. 189 (1756).

Syn. *Lactuca scariola* L., Sp. Pl., ed. 2, 1119 (1763), nom. superfl.

Glabrous or setose, annual or biennial, 0.3-1.2(1.5) m; stems erect, rigid, usually unbranched at the base, sulcate; leaves 3-8 x 1.2-5 cm, held vertically, the midrib spinulose on the lower surface; basal leaves tapering at the base, scarcely petiolate; cauline leaves oblong in outline, pinnatifid to pinnatisect, few-lobed, sessile, auriculate, the margin denticulate-spinulose, uppermost leaves small, undivided, clasping; peduncle to 2.5 cm, bracteate; capitula 7-15(20)-flowered, numerous, in lax paniculate inflorescences to 30(50) cm; involucre 8-9 x 2.5-3.5 mm, cylindrical, wider and accrescent in fruit; phyllaries c. 14, 3-seriate, glabrous, often purple-tinged; outer phyllaries 2-3 x 1-1.5 mm, narrowly ovate, obtuse, the inner 8-9 x 2 mm, lanceolate, subacute, scarious-margined; ligule 5-7 mm, yellow, drying blue; corolla-tube c. 4 mm, hairy above; achenes 6-8 mm including the beak; achene body 3-3.5 x 1.25-1.5 mm, oblong-obovate, strongly compressed, with c. 8 prominent nerves on each face, scabridulous, pale brown; beak 4.5-5 mm, slender, pallid; pappus 4.5-5 mm, of white, silky, remotely scabridulous hairs.

N, O, S; waste ground, roadsides, edges of cultivation. Mediterranean region, temperate Europe and Asia, introduced elsewhere.

NOTE: According to Meikle, Fl. Cyprus 2: 1028 (1985), the cultivated lettuce (*Lactuca sativa* L.) is thought to be an ancient derivative of *Lactuca serriola*, but differs in its smooth stems and leaves, and in the leaf-blade being held in the normal horizontal position. Féraková, in Tutin *et al.*, Fl. Europ. 4: 328 (1976) also noted: "*Lactuca sativa* probably originated in Egypt from *L. serriola*." The lettuce was the symbol of fertility in Ancient Egypt.

97. *Scariola* F.W. Schmidt

Biennial or perennial herbs or low wiry shrubs; stems glabrous or crispate-pubescent; leaves alternate, runcinate-pinnatisect, the basal attenuate to a petioid base, the cauline sessile, auriculate, decurrent; capitula sessile, ligulate, homogamous, 4-8-flowered; involucre cylindrical, 3-4-seriate, elongate in fruit; receptacle naked; corolla yellow; achenes homomorphic, compressed, many-ribbed, scabrid-hispidulous, attenuate to a  $\pm$  distinct beak; pappus of numerous equal slender scabridulous white hairs. About 8 species, Europe, Mediterranean region, eastwards to Central Asia.

1. *Scariola orientalis* (Boiss.) Soják, Novit. Bot. Del. Sem. Hort. Bot. Univ. Carol. Prag. 1962: 46 (1962).

Syns. *Phaenopus orientalis* Boiss., Voy. Bot. Midi Esp. 390 (1839).

*Lactuca orientalis* (Boiss.) Boiss., Fl. Orient. 3: 819 (1875).

Low shrub 15-50 cm, thinly woolly-floccose, becoming glabrescent; stems stiff, wiry, silvery-white, divaricately branched, spinescent; leaves 1.5-8 x 0.4-2.5 cm, the basal remotely dentate, not lobed, tapering to a winged petiole; cauline leaves runcinate-pinnatisect, the lobes oblong-deltoid, sessile, long-decurrent, with adnate linear appendages; uppermost leaves small, narrowly lanceolate, entire; capitula solitary, sessile, in a much-branched spiciform inflorescence,  $\pm$  5-flowered; involucre 0.8-1.1 cm, elongate in fruit to 1.6 cm, cylindrical; phyllaries  $\pm$  10, 3-seriate, narrowly scarious-margined, glabrous or thinly floccose, often pink-tinged; outer phyllaries 2-4 x 2 mm,

broadly ovate, obtuse, the inner 0.8-1.1 x 0.2 cm, oblong-lanceolate, obtuse; corolla 1.5-2 cm; ligule yellow, sometimes tinged reddish on the lower side; achenes 8-9 x 1.2 mm, narrowly elliptic, compressed,  $\pm$  8-ribbed on each face, attenuate to a beak 2-3 mm, brown; pappus 6-8 mm, of white scabridulous hairs.

De, S; stony desert wadis. Egypt, Palestine, Lebanon, Syria, Arabia, Iran, eastwards to Central Asia.

NOTE: Syntypes of *Phaenopus orientalis* were collected in Sinai, Lebanon and Iran. Some authors, e.g. Täckholm, Stud. Fl. Egypt, ed. 2, 608 (1974) and Feinbrun-Dothan, Fl. Palaest. 3: 438 (1978) have included *Scariola orientalis* within the genus *Lactuca*.

## 98. *Taraxacum* F. H. Wigg., nom. conserv.

Glabrous or arachnoid, scapose perennial herbs; leaves in a basal rosette, commonly runcinate-pinnatisect; scapes 1 or few, simple; capitula solitary, very rarely 2 or more, terminal and lateral, homogamous, ligulate; involucre cylindrical-campanulate; phyllaries reflexed, imbricate, multi-seriate, the outer short, sometimes spreading and reflexed to form a calyculus, the apex often with a distinct appendage; receptacle naked; ligules usually yellow, rarely white or pink; anthers shortly sagittate at the base; style-branches slender, blunt; achenes oblong-fusiform, 10-ribbed, usually spinulose above, narrowed to a conical or cylindrical cone at the apex, which bears a slender white beak; pappus white or tinged purple, of multi-seriate scabridulous hairs, persistent. About 2000 species, many of them apomicts, usually grouped under about 60 aggregate names used by the earlier authors, each comprising several distinct taxa; temperate regions, including South America, some cosmopolitan weeds.

1. Scape 5-8(-12) cm; beak of the achene 5.5-6.5 mm  
+ Scape 15-25(-40) cm; beak of the achene c. 1 cm

1. **T. minimum**  
2. **T. turcicum**

1. ***Taraxacum minimum*** (Guss.) N. Terracc., Atti Ist. Incorags Nap., ser. 2, 6: 359 (1869).  
Syn. *Leontodon minimum* Guss., Fl. Sic. Syn. 2, 1: 397 (1843).

Glabrescent dwarf perennial herb; taproot thick, black; leaves 3-10 x 0.6-1.5 cm, in a rosette, runcinate-pinnatisect; lobes few, remotely dentate or entire, the terminal lobe deltoid, larger than the laterals; petioles winged, pilose at the base; capitula solitary, on scapes 5-8(-12) cm; involucre 1-1.2 x 0.5-0.6 cm, campanulate, glabrous; phyllaries 4-seriate, all with a median black midrib and broad scarious margins; outer phyllaries 2-4.5 x 1.5 mm, broadly ovate to lanceolate, obtuse, the inner 1-1.2 x 0.15 cm, linear-lanceolate, obtuse; corolla c. 1.5 cm; ligule c. 6 mm, pale yellow, drying bluish; achenes 1-1.1 cm including the beak; achene body 4.5-5 x 1 mm, oblong-fusiform, with coarse spinules on the upper part; beak 5.5-6.5 mm, slender, white; pappus c. 4 mm, of white scabridulous hairs.

M (Burg El-Arab), ruins, rocky crevices. Southern Europe, Algeria, Egypt, Palestine, Lebanon, western Turkey.

2. ***Taraxacum turcicum*** Soest, Acta Bot. Neerl. 17: 495, f. 8 (1968).

Glabrous perennial, stout at the base; leaves 5-15 x 1-4 cm, in a rosette, oblanceolate in outline, runcinate-pinnatisect, lobes narrowly to broadly triangular, acute; petiole very

narrowly winged; capitula solitary on scapes 15-25(40) cm; involucre 1-1.2 x 0.8 cm, campanulate, glabrous; phyllaries 4-seriate, the outer 3.5-6 x 1.5 mm, lanceolate, narrowly scarious-margined, obtuse, reflexed before and after anthesis; inner phyllaries 1-1.2 x 0.15-0.2 cm, linear-lanceolate, broadly scarious-margined, obtuse, elongate to 2 cm in fruit; corolla 1.5-1.8 cm; ligule 6-7 mm, yellow; achenes 1.3-1.4 cm including the beak; achene body 3.5-4 x 0.8 mm, fusiform, spinulose in the upper part, the cone c. 0.8 mm, the beak c. 1 cm; pappus 6-7 mm, of white setulose hairs.

N (Zohriya Garden, Cairo); weed on lawns. Endemic to Turkey, naturalized in North Africa, Saudi Arabia and probably in some other Mediterranean countries.

## Glossary for the Compositae account

- anther appendages** (*apical and basal*): two zones of variously developed sterile tissue above and beneath the pollen sac in the anther thecae. Their shape and size can be a particularly useful diagnostic character at the generic level in many tribes.
- barbellate**: referring to the pappus setae of the majority of Compositae and often referred to as scabrid, when the free apical portions of the cells constituting the pappus setae are less than the diameter of the rachis of the setae.
- bilabiate**: 2-lipped corolla, usually with one conspicuous outer lip, or ray, with 3 apical teeth, and 2 inner free lobes, a feature common in the tribe Mutisieae.
- calyculate**: possessing a *calyculus*, whereby involucre is subtended by a subsidiary series of outer bracts, often quite dissimilar to the phyllaries. The calyculus is common in several members of the tribe Senecioneae but is also found in the Heliantheae, and its presence, or absence, can be useful diagnostically.
- carpopodium**: the tissue representing the abscission zone of the achene from the receptacle, and is actually receptacular tissue. It is often well developed and diagnostic for many genera in several tribes. Overall shape and the constituent cell ornamentation can provide useful taxonomic characters, although the latter is impossible to see without the use of a compound light microscope.
- disciform**: a capitulum appearing to possess only one type of floret, but the marginal florets usually of a different sex; such a capitulum is referred to as *heterogamous*.
- discoïd**: a capitulum containing only one type of floret: all male, all female or all hermaphrodite; such a capitulum is referred to as *homogamous*.
- erostrate**: beakless, e.g. in an achene without any elongated apical portion.
- glomerule**: often used to refer to aggregations of capitula, often with fused bases, or phyllaries of adjacent capitula adhering by their indumentum, but without a recognizable secondary receptacle. A typical example is *Flaveria*.
- heterogamous**: when two or more different types of florets occur in a capitulum.
- homogamous**: strictly when all the florets in a capitulum are identical in sexual arrangement, i.e. all unisexual, all neuter or all hermaphrodite.
- involucre**: the basal protective cup, made up of phyllaries, of the capitulum which protects both the buds and the developing achenes.
- ligulate**: both a floret type and capitulum type when the florets bear a 5-toothed strap-like corolla limb, a ligule. In the tribe Lactuceae all florets in the capitulum are ligulate, in others, e.g. Mutisieae, a few genera have ligulate capitula.

**ligule:** strap-like corolla limb with 5 teeth at its apex. This is widely confused in the literature with the limb of ray florets, which can have between 1 and 4 teeth at its apex, but never 5.

**paleae:** variously interpreted as 'rudimentary bracts' subtending individual florets, or as phyllaries interspersed amongst the florets. In several cultivated genera, where the paleae become conspicuous with maturation of the achenes, it might be difficult to interpret them as phyllaries. Paleae are common in the Heliantheae (e.g. *Galinsoga*, *Verbesina*) and Anthemideae (e.g. *Anacyclus*, *Anthemis*, *Chamaemelum*), but are present in other tribes.

**pedicel:** strictly refers to the stalk of a single flower, but sometimes in the Compositae refers to the stalk of a single capitulum. It is useful to use this term when compound, or complex, inflorescences are being described.

**peduncle:** in the strictest sense refers to the main stalk of the inflorescence, a point difficult to determine in second or third order inflorescences found in many Compositae, and certainly where no real separation is found between the inflorescence and vegetative structures.

**phyllary:** often referred to as involucre bracts, the phyllaries constitute the involucre. In the tribe Senecioneae, the phyllaries are typically seen as uniseriate with the edges of adjacent phyllaries parallel, although the scarious margins often overlap. In other tribes the phyllaries are seen to be in several, often spiral series, usually with longer inner phyllaries (the phyllaries are then called *gradate*), these often with different shapes to the outer. Somewhat rarely the outer phyllaries may be larger than the inner and in such cases the outer are sometimes herbaceous. The number of series and arrangement of phyllaries is often diagnostic, those that overlap distinctly being termed *imbricate*.

**plumose:** when the free apical portions of the cells constituting the pappus setae are at least three times longer than the diameter of the central rachis of the setae. Sub-plumose refers to shorter free apical portions, but always longer than the diameter of the rachis of the setae. Examples of plumose setae can be seen in *Notobasis* and *Onopordum*.

**pseudobilabiate:** the corolla of the floret is bilabiate but is represented by an outer ray with 4 apical teeth and a single inner lobe.

**radiate:** a radiate capitulum has one or more whorls of marginal florets bearing a distinctive radiating extended limb, the limb with 1-4 apical teeth. Often the marginal florets are of a different sex to the central disc florets and the capitulum usually heterogamous. Radiate capitula can be found in most tribes in the family.

**radiant:** common in the tribe Cardueae. Essentially a disciform capitulum where the outer florets become much enlarged with zygomorphic corollas that have longer corolla-lobes on the outer edge; these florets are often sterile, the capitulum therefore heterogamous.

**rostrate:** possessing a rostrum; the rostrum or beak, the elongated apical portion of an achene, e.g. in *Heteroderis*, *Leontodon*, *Taraxacum*, *Tragopogon*, etc.

**setose:** possessing setae and usually referring to the coarse hairs on receptacles. In the tribe Cardueae the receptacle is often conspicuously setose, rather than paleaceous, with numerous smooth setae present between the achenes (e.g. *Centaurea*); papillae and hairs are present in other tribes.

**stereome:** a basal cartilaginous portion of the phyllary. In some genera it is divided, or fenestrate, when there are translucent sections to it (e.g. *Helichrysum*, *Pseudognaphalium*). This should not be confused with the distinction between a phyllary with a papery apical portion where the distal area is thinner and almost translucent.

**style arms:** the majority of Compositae have two distinct style arms at the apex of the style which, in many groups are distinctly bifid and separate. The shape and length of these, and their apical appendages are often of considerable diagnostic use, as are the arrangements of stigmatic papillae and sweeping hairs on them.

**synflorescence:** often used to describe the whole inflorescences in Compositae, but wrongly so. The term used here refers to second order inflorescences where capitula are condensed on to a recognizable secondary receptacle and, often but not always, possessing a secondary involucre. A typical example is in *Echinops*, where single-floreted capitula are arranged on a  $\pm$  spherical secondary receptacle.





*Lantana camara*



*Phyla nodiflora*



*Avicennia marina*



*Lavandula coronopifolia*



*Mentha longifolia subsp. typhoides*



*Origanum syriacum subsp. sinaicum*



*Micromeria nervosa*



*Salvia aegyptiaca*



*Salvia deserti*



*Salvia lanigera*



*Salvia multicaulis*



*Salvia spinosa*



*Nepeta septemcrenata*



*Marrubium alysson*



*Marrubium vulgare*



*Stachys aegyptiaca*



*Lamium amplexicaule*



*Ballota undulata*



*Phlomis floccosa*



*Teucrium polium*



*Prasium majus*



*Teucrium polium*



Ajuga iva



Ajuga chamaepitys *subsp.* tridactylites



Solanum coagulans



Solanum incanum



*Solanum forsskaolii*



*Solanum sinaicum*



*Withania somnifera*



*Solanum nigrum*





*Withania obtusifolia*



*Hyoscyamus muticus*



*Datura innoxia*



*Lycium europaeum*



*Hyoscyamus boveanus*



*Hyoscyamus boveanus*



*Hyoscyamus desertorum*



*Nicotiana glauca*



*Hyoscyamus aureus*



*Verbascum letourneuxii*



*Verbascum sinaiticum*

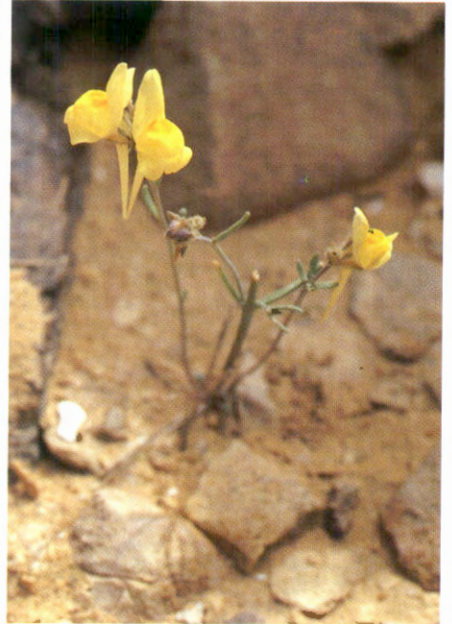




*Verbascum sinuatum*



*Kickxia scoparia*



*Linaria haelava*



*Kickxia aegyptiaca subsp. aegyptiaca*



*Kickxia floribunda*



*Striga hermonthica*



*Orobanche cernua*



*Blepharis edulis*



*Plantago crypsoides*



*Cistanche phelypaea*



*Plantago crypsoides*



*Plantago amplexicaulis*



*Plantago major*



*Plantago cylindrica*



*Echinops glaberrimus*



*Plantago ovata*



*Gundelia tournefortii*





*Echinops hussonii*

*Echinops spinosus*





*Carduus getulus*



*Notobasis syriaca*



*Atractylis cancellata*



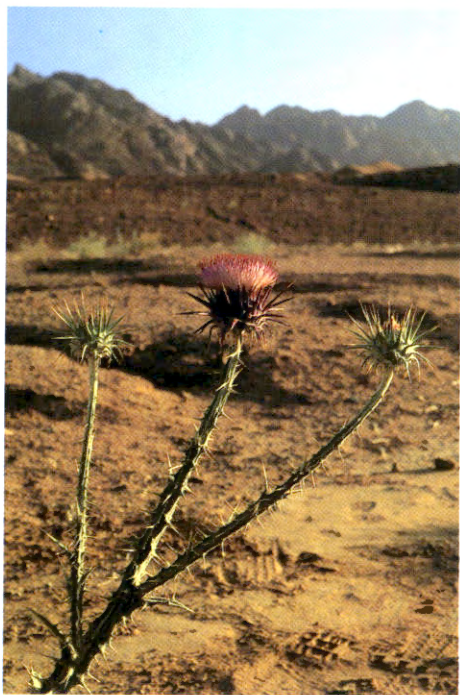
*Atractylis carduus*



*Silybum marianum*



*Onopordum alexandrinum*



*Onopordum ambiguum*



*Centaurea eryngioides*



*Centaurea pallescens*



*Centaurea sinaica*



*Centaurea procurrens*



*Centaurea calcitrapa*



*Volutaria lippii*



*Centaurea alexandrina*



*Carthamus nitidus*



*Carduncellus eriocephalus*



*Carduncellus mareoticus*



*Pluchea dioscoridis*



*Symphyotrichum squamatum*



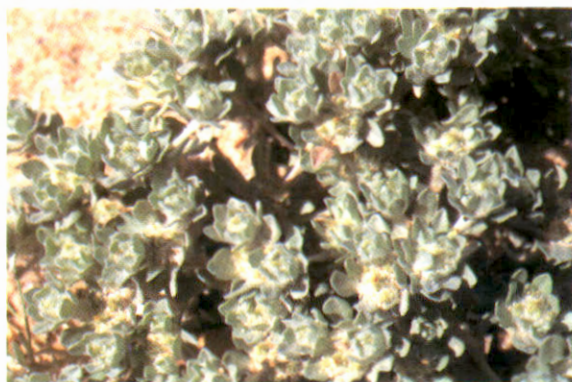
*Conyza bonariensis*



*Sphaeranthus suaveolens* var. *suaveolens*



*Ifloga spicata*



*Filago contracta*



*Filago desertorum*



*Gymnarrhena micrantha*



*Phagnalon rupestre*



*Limbarda crithmoides*





*Dittrichia graveolens*



*Pulicaria incisa*



*Iphiona mucronata*



*Iphiona scabra*



*Pulicaria undulata* subsp. *undulata*



*Anvillea garcinii*



*Asteriscus hierochunticus*



*Asteriscus spinosus*



*Nauplius graveolens*



*Xanthium strumarium*



*Eclipta prostrata*



*Bidens pilosa*



*Anthemis melampodina subsp. deserti*



*Anacyclus monanthos subsp. monanthos*



*Achillea fragrantissima*



*Verbesina encelioides*



*Achillea santolina*



*Glebionis coronaria*



*Cotula cinerea*



*Artemisia monosperma*



Artemisia scoparia



Artemisia judaica



Calendula arvensis



Senecio glaucus *subsp.* coronopifolius



*Cichorium endivia subsp. divaricatum*



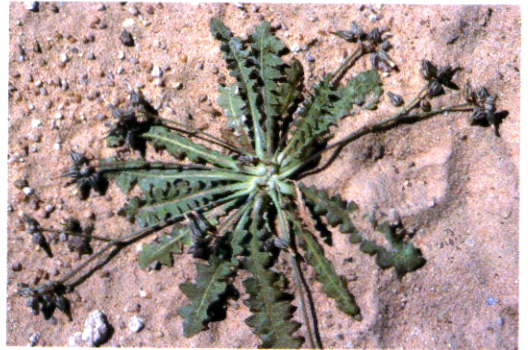
*Koelpinia linearis*



*Launaea nudicaulis*



*Scorzonera undulata*



*Launaea capitata*



*Launaea fragilis subsp. fragilis*



*Reichardia tingitana*



*Crepis sancta*



*Sonchus maritimus*



*Sonchus oleraceus*



## Index to line drawings

- Achillea fragrantissima 248  
Achillea santolina 248  
Aetheorhiza bulbosa 304  
Ageratum conyzoides 184  
Ageratum houstonianum 184  
Ajuga chamaepitys  
    *subsp.* tridactylites 32  
Ajuga iva 32  
Ambrosia artemisiifolia 231  
Ambrosia maritima 231  
Anacyclus monanthos  
    *subsp.* monanthos 248  
Anarrhinum pubescens Fresen. 57  
Anthemis bornmuelleri 240  
Anthemis chia 244  
Anthemis cotula 240  
Anthemis hebronica 244  
Anthemis indurata 240  
Anthemis melampodina  
    *subsp.* melampodina 244  
Anthemis microsperma 244  
Anthemis pseudocotula 240  
Anthemis retusa 240  
Anthemis scrobicularis 244  
Anthemis zoharyana  
    *var.* zoharyana 244  
Anticharis arabica 75  
Anticharis glandulosa 75  
Anticharis linearis 75  
Anvillea garcinii 224  
Artemisia judaica 260  
Artemisia monosperma 256  
Artemisia scoparia 256  
Asteriscus hierochunticus 224  
Asteriscus spinosus 224  
Asyneuma rigidum  
    *subsp.* sinai 133  
Atractylis cancellata 154  
Atractylis carduus 151  
Atractylis mernepthae 154  
Atractylis prolifera 154  
Atractylis serratuloides 154  
Avicennia marina 4  
Bacopa monnieri 75  
Ballota damascena 27  
Ballota pseudodictamnus 27  
Ballota saxatilis 27  
Ballota undulata 27  
Barleria acanthoides 98  
Barleria hochstetteri 98  
Bidens bipinnata 235  
Bidens pilosa 235  
Bidens schimperi 235  
Blainvillea acmella 228  
Blepharis attenuata 98  
Blepharis edulis 98  
Calendula arvensis 268  
Calendula tripterocarpa 268  
Campanula dimorphantha 133  
Campanula dulcis 133  
Campanula erinus 133  
Campanula sulphurea 133  
Carduncellus eriocephalus 180  
Carduncellus mareoticus 180  
Carduus argentatus 148  
Carduus getulus 148  
Carlina involucrata 148  
Carthamus glaucus  
    *subsp.* alexandrinus 175  
Carthamus lanatus 175  
Carthamus nitidus 175  
Centaurea aegialophila 173  
Centaurea aegyptiaca 169  
Centaurea alexandrina 171  
Centaurea ammocyanus 164  
Centaurea calcitrapa 171  
Centaurea dimorpha 167  
Centaurea eryngioides 164  
Centaurea furfuracea 167  
Centaurea glomerata 164  
Centaurea melitensis 167  
Centaurea pallescens 169  
Centaurea postii Boiss. 167  
Centaurea procurrens 169  
Centaurea pumilio 173  
Centaurea scoparia 173  
Centaurea sinaica 169  
Centaurea solstitialis 167  
Cephalaria syriaca 124  
Ceruana pratensis 184  
Chamaemelum mixtum 248  
Chiliadenus candicans 215  
Chiliadenus iphionoides 215  
Chiliadenus montanus 215  
Chlamydomphora tridentata 252  
Cichorium endivia  
    *subsp.* divaricatum 268  
Cistanche tubulosa 91  
Clerodendrum acerbianum 27  
Cnicus benedictus 180  
Conyza aegyptiaca 191  
Conyza bonariensis 191  
Conyza canadensis 191  
Conyza stricta 191  
Cotula anthemoides 256  
Cotula cinerea 256  
Crepis aculeata 304  
Crepis aspera 304  
Crepis libyca 301  
Crepis micrantha 301

Crepis nigricans 304  
 Crepis sancta 301  
 Crepis senecioides 301  
 Crupina crupinastrum 164  
 Cynara cornigera 160  
 Datura innoxia 45  
 Datura stramonium 45  
 Dicoma schimperi 180  
 Dicoma tomentosa 180  
 Dittrichia viscosa 210  
 Doellia bovei 188  
 Ecbolium viride 102  
 Echinops glaberrimus 144  
 Echinops hussonii 144  
 Echinops spinosus 144  
 Eclipta prostrata 231  
 Eremostachys laciniata 32  
 Ethulia conyzoides 184  
 Felicia dentata  
     *subsp.* dentata 188  
 Filago contracta 196  
 Filago desertorum 196  
 Filago mareotica 196  
 Flaveria bidentis 235  
 Galinsoga parviflora 228  
 Garhadiolus angulosus 274  
 Geigeria alata 224  
 Geropogon hybridus 284  
 Glebionis coronaria 252  
 Globularia alypum 98  
 Globularia arabica 98  
 Gnaphalium polycaulon 206  
 Gnaphalium uliginosum 206  
 Grangea maderaspatana 184  
 Gundelia tournefortii 144  
 Gymnarrhena micrantha 202  
 Hedychnois rhagadioloides 274  
 Helichrysum conglobatum 210  
 Helichrysum glumaceum 210  
 Helichrysum orientale 210  
 Helminthotheca echioides 277  
 Heteroderis pusilla  
     *var.* leucocephala 307  
 Homognaphalium crispatum 206  
 Homognaphalium pulvinatum 206  
 Hyoscyamus albus 51  
 Hyoscyamus aureus 51  
 Hyoscyamus boveanus 49  
 Hyoscyamus desertorum 49  
 Hyoscyamus muticus 49  
 Hyoscyamus pusillus 47  
 Hyoscyamus reticulatus 47  
 Hyoseris radiata  
     *subsp.* graeca 274  
 Hyoseris scabra 274  
 Ifloga spicata 196  
 Iphiona mucronata 215  
 Iphiona scabra 215  
 Jamesbrittenia dissecta 75  
 Justicia heterocarpa 102  
     *subsp.* heterocarpa 102  
 Justicia ladanoides 102  
 Kickxia acerbiana 67  
 Kickxia aegyptiaca  
     *subsp.* aegyptiaca 67  
 Kickxia elatine  
     *subsp.* crinita 67  
 Kickxia floribunda 67  
 Kickxia hastata 67  
 Kickxia heterophylla 67  
 Kickxia spuria 67  
 Koelpinia linearis 274  
 Lactuca saligna 314  
 Lactuca serriola 314  
 Lactuca undulata 314  
 Lallelantia royleana 23  
 Lamium amplexicaule 23  
 Lantana viburnoides 4  
 Lasiopogon muscoides 202  
 Lasiospermum brachyglossum 252  
 Launaea amal-aminae 296  
 Launaea angustifolia 296  
 Launaea capitata 292  
 Launaea fragilis  
     *subsp.* fragilis 296  
 Launaea massauensis 292  
 Launaea mucronata  
     *subsp.* mucronata 296  
 Launaea nudicaulis 292  
 Launaea procumbens 292  
 Launaea spinosa 292  
 Lavandula atriplicifolia 10  
 Lavandula coronopifolia 10  
 Lavandula multifida 10  
 Lavandula pubescens 10  
 Legousia speculum-veneris 133  
 Leontodon hispidulus 277  
 Leontodon laciniatus 277  
 Leontodon simplex 277  
 Leontodon tuberosus 277  
 Leucas inflata 27  
 Leucas neuffizeana 27  
 Leucas urticifolia 27  
 Leysera leyseroides 210  
 Limbarda crithmoides 210  
 Limosella aquatica 75  
 Linaria albifrons 62  
 Linaria chalepensis 62  
 Linaria haelava 62  
 Linaria joppensis 62  
 Linaria micrantha 62  
 Linaria simplex 62  
 Linaria tenuis 62  
 Lindenbergia indica 75  
 Lindernia parviflora 83  
 Lycium europaeum 42  
 Lycium schweinfurthii 42  
 Lycium shawii 42  
 Mantisalca salmantica 175  
 Marrubium alysson 23

Marrubium vulgare 23  
Matricaria aurea 252  
Matricaria recutita 252  
Mentha longifolia  
    *subsp.* schimperii 10  
    *subsp.* typhoides 10  
Mentha pulegium 10  
Micromeria imbricata 15  
Micromeria myrtifolia 15  
Micromeria nervosa 15  
Micromeria sinaica 15  
Misopates orontium 71  
Nauplius aquaticus 224  
Nauplius graveolens 224  
Nepeta septemcrenata 23  
Nicandra physalodes 42  
Nicotiana glauca 53  
Nicotiana plumbaginifolia 53  
Notobasis syriaca 151  
Ocimum forsskaolii 10  
Onopordum alexandrinum 160  
Onopordum ambiguum 160  
Origanum syriacum  
    *subsp.* sinaicum 15  
Orobanche aegyptiaca 91  
Orobanche cernua 91  
Orobanche crenata 91  
Orobanche ramosa 91  
Orobanche schultzei 91  
Orthosiphon pallidus 10  
Osteospermum vaillantii 268  
Otanthus maritimus 248  
Otostegia fruticosa  
    *subsp.* fruticosa 32  
Parentucellia viscosa 83  
Pedalium murex 105  
Pegolettia senegalensis 215  
Peristrophe paniculata 102  
Phagnalon barbeyanum 202  
Phagnalon rupestre 202  
Phagnalon schweinfurthii 202  
Phagnalon sinaicum 202  
Phlomis aurea 32  
Phlomis floccosa 32  
Phyla nodiflora 4  
Physalis angulata 42  
Picris altissima 281  
Picris asplenioides 281  
Picris cyanocarpa 281  
Picris longirostris 281  
Picris sulphurea 281  
Plantago afra 111  
Plantago albicans 118  
Plantago amplexicaulis 118  
Plantago arenaria 111  
Plantago ciliata Desf. 118  
Plantago coronopus 114  
Plantago crassifolia 114  
Plantago crypsoides 114  
Plantago cylindrica 118  
Plantago exigua 111  
Plantago lagopus 114  
Plantago lanceolata 114  
Plantago major 114  
Plantago notata 118  
Plantago ovata 118  
Plantago phaeostoma 111  
Plantago sinaica 111  
Plantago squarrosa 111  
Pluchea dioscoridis 188  
Prasium majus 32  
Priva adhaerens 4  
Pseudoconyza viscosa 188  
Pseudognaphalium luteoalbum 206  
Pterocephalus brevis 127  
Pterocephalus plumosus 127  
Pterocephalus sanctus 127  
Pulicaria arabica 218  
Pulicaria incisa 218  
Pulicaria inuloides 218  
Pulicaria petiolaris 218  
Pulicaria sicula 218  
Pulicaria undulata  
    *subsp.* undulata 218  
Reichardia tingitana 296  
Rhagadiolus stellatus 274  
Rogeria adenophylla 105  
Ruellia patula 102  
Salvia aegyptiaca 19  
Salvia deserti 19  
Salvia dominica 19  
Salvia lanigera 19  
Salvia multicaulis 19  
Salvia spinosa 23  
Salvia verbenaca 23  
Scabiosa arenaria 124  
Scabiosa eremophila 124  
Scabiosa olivieri 124  
Scabiosa palaestina 124  
Schweinfurthia pedicellata 71  
Scolymus hispanicus 268  
Scolymus maculatus 268  
Scorzonera judaica 288  
Scorzonera mollis 288  
Scorzonera schweinfurthii 288  
Scorzonera undulata 288  
Scrophularia arguta 71  
Scrophularia deserti 71  
Scrophularia libanotica 71  
Scrophularia sinaica 71  
Scrophularia xanthoglossa 71  
Senecio aegyptius  
    *var.* aegyptius 264  
Senecio flavus 264  
Senecio glaucus  
    *subsp.* coronopifolius 264  
Senecio hoggariensis 264  
Senecio vulgaris 264  
Seriphidium herba-album 260

Sesamum alatum 105  
 Silybum marianum 157  
 Solanum coagulans 37  
 Solanum elaeagnifolium 37  
 Solanum forsskaolii 37  
 Solanum incanum 37  
 Solanum nigrum 37  
 Solanum sinaicum 37  
 Solanum villosum 37  
 Sonchus asper  
     *subsp.* asper 310  
     *subsp.* glaucescens 310  
 Sonchus macrocarpus 310  
 Sonchus maritimus 310  
 Sonchus oleraceus 310  
 Sonchus tenerrimus 310  
 Sphaeranthus suaveolens  
     *var.* suaveolens 196  
     *var.* abyssinicus 196  
 Sphenoclea zeylanica 133  
 Stachys aegyptiaca 23  
 Striga asiatica 83  
 Striga gesnerioides 83  
 Striga hermonthica 83  
 Symphyotrichum squamatum 196  
 Tagetes minuta 235  
 Tanacetum sinaicum 256  
 Taraxacum minimum 314  
 Teucrium leucocladum 32  
 Teucrium polium 32  
 Thymus bovei 15  
 Thymus capitatus 15  
 Thymus decussatus 15  
 Tragopogon collinus 284  
 Tragopogon sinuatus 284  
 Tripleurospermum auriculatum 252  
 Urospermum picroides 277  
 Utricularia gibba 105  
 Utricularia inflexa 105  
 Valerianella szovitsiana 124  
 Verbascum fruticosum 57  
 Verbascum letourneuxii 57  
 Verbascum schimperianum 57  
 Verbascum sinaiticum 57  
 Verbascum sinuatum 57  
 Verbena officinalis 4  
 Verbena supina 4  
 Verbesina encelioides 235  
 Veronica anagallis-aquatica 83  
 Veronica anagalloides 83  
 Veronica biloba 80  
 Veronica campylopoda 80  
 Veronica persica 80  
 Veronica polita 80  
 Veronica rubrifolia  
     *subsp.* respectatissima 80  
 Veronica syriaca 80  
 Volutaria lippii 175  
 Volutaria sinaica 175  
 Volutaria tubuliflora 175  
 Wahlenbergia campanuloides 127  
 Wahlenbergia lobelioides  
     *subsp.* riparia 127  
 Withania obtusifolia 42  
 Withania somnifera 42  
 Xanthium spinosum 228  
 Xanthium strumarium 228  
 Ziziphora capitata 19  
 Ziziphora tenuior 19  
 Zoegea purpurea 164

## Index to colour photographs

- Achillea fragrantissima 348  
Achillea santolina 349  
Ajuga chamaepitys  
  *subsp.* tridactylites 327  
Ajuga iva 327  
Anacyclus monanthos  
  *subsp.* monanthos 348  
Anthemis melampodina  
  *subsp.* deserti 348  
Anvillea garcinii 346  
Artemisia judaica 350  
Artemisia monosperma 349  
Artemisia scoparia 350  
Asteriscus hierochunticus 346  
Asteriscus spinosus 346  
Atractylis cancellata 338  
Atractylis carduus 338  
Avicennia marina 321  
Ballota undulata 325  
Bidens pilosa 347  
Blepharid edulis 334  
Calendula arvensis 350  
Carduncellus eriocephalus 342  
Carduncellus mareoticus 342  
Carduus getulus 338  
Carthamus nitidus 341  
Centaurea alexandrina 341  
Centaurea calcitrapa 341  
Centaurea eryngioides 340  
Centaurea pallescens 340  
Centaurea procurrans 340  
Centaurea sinaica 340  
Cichorium endivia  
  *subsp.* divaricatum 351  
Cistanche phelypaea 334  
Conyza bonariensis 342  
Cotula cinerea 349  
Crepis sancta 352  
Datura innoxia 329  
Dittrichia graveolens 345  
Echinops glaberrimus 336  
Echinops hussonii 337  
Echinops spinosus 337  
Eclipta prostrata 347  
Filago contracta 343  
Filago desertorum 343  
Glebionis coronaria 349  
Gundelia tournefortii 336  
Gymnarrhena micrantha 344  
Hyoscyamus aureus 331  
Hyoscyamus boveanus 330  
Hyoscyamus desertorum 330  
Hyoscyamus muticus 329  
Ifloga spicata 343  
Iphiona mucronata 345  
Iphiona scabra 345  
Kickxia aegyptiaca  
  *subsp.* aegyptiaca 333  
Kickxia floribunda 333  
Kickxia scoparia 332  
Koelpinia linearis 351  
Lamium amplexicaule 325  
Lantana camara 321  
Launaea capitata 351  
Launaea fragilis  
  *subsp.* fragilis 352  
Launaea nudicaulis 351  
Lavandula coronopifolia 321  
Limbarda crithmoides 344  
Linaria haelava 332  
Lycium europaeum 329  
Marrubium alysson 324  
Marrubium vulgare 324  
Mentha longifolia  
  *subsp.* typhoides 322  
Micromeria nervosa 322  
Nauplius graveolens 347  
Nepeta septemcrenata 324  
Nicotiana glauca 331  
Notobasis syriaca 338  
Onopordum alexandrinum 339  
Onopordum ambiguum 339  
Origanum syriacum  
  *subsp.* sinaicum 322  
Orobancha cernua 334  
Phagnalon rupestre 344  
Phlomis floccosa 325  
Phyla nodiflora 321  
Plantago amplexicaulis 335  
Plantago crypsoides 334, 335  
Plantago cylindrica 335  
Plantago major 335  
Plantago ovata 336  
Pluchea dioscoridis 342  
Prasium majus 326  
Pulicaria incisa 345  
Pulicaria undulata 346  
Reichardia tingitana 352  
Salvia aegyptiaca 322  
Salvia deserti 323  
Salvia lanigera 323  
Salvia multicaulis 323  
Salvia spinosa 324  
Scorzonera undulata 351  
Senecio glaucus  
  *subsp.* coronopifolius 350  
Silybum marianum 339  
Solanum coagulans 327  
Solanum forsskaolii 328  
Solanum incanum 327  
Solanum nigrum 328  
Solanum sinaicum 328  
Sonchus maritimus 352  
Sonchus oleraceus 352  
Sphaeranthus suaveolens  
  *var.* suaveolens 343  
Stachys aegyptiaca 325  
Striga hermonthica 333  
Symphyotrichum squamatum 342  
Teucrium polium 326  
Verbascum letourneuxii 331  
Verbascum schimperianum  
Verbascum sinaicum 331  
Verbascum sinuatum 332  
Verbesina encelioides 348  
Volutaria lippii 341  
Withania obtusifolia 329  
Withania somnifera 328  
Xanthium strumarium 347

## Index to scientific names

accepted names in **bold type**, synonyms in *italic type*  
page numbers in *italic type* for line drawings, **bold type** for colour photographs

- ACANTHACEAE 97  
*Acanthodium hirtum* Nees 100  
*Acanthodium spicatum* Delile 99  
*Acanthus edulis* Forssk. 99  
**Achillea** L. 249  
**Achillea fragrantissima** (Forssk.) Sch.Bip.  
249, 248, 348  
**Achillea santolina** L. 250, 248, 349  
*Achyrocline glumacea* (DC.) Oliv. & Hiern  
209  
*Acleia belbeysia* (Delile) DC. 265  
*Acmella linnaei* Cass. 232  
*Acmella mauritiana* L. C. Rich. 232  
*Actinomeris* Nutt. 236  
*Aegialophila* Boiss. & Heldr. 162  
*Aegialophila cretica* Boiss. & Heldr. 172  
*Aegialophila pumilio* (L.) Boiss. 172  
**Aetheorhiza** Cass. 306  
**Aetheorhiza bulbosa** (L.) Cass. 306, 304  
*Aethlopappus* Cass. 162  
*Agathaea dentata* A. Rich. 187  
**Ageratum** L. 185  
*Ageratum conyzoides* L. 185  
var. *mexicanum* sensu Täckh. 185  
**Ageratum conyzoides** L. 185, 184  
**Ageratum houstonianum** Mill. 185, 184  
*Aglotoma* Raf. 194  
**Ajuga** L. 34  
**Ajuga chamaepitys** (L.) Schreb. 34  
subsp. *tridactylites* (Benth.) P. H. Davis  
34, 32, 327  
*Ajuga chia* Schreb. 34  
var. *tridactylites* (Benth.) Boiss. 34  
**Ajuga iva** (L.) Schreb. 34, 32, 327  
*Ajuga tridactylites* Benth. 34  
*Amberboa crupinoides* (Desf.) DC. 177  
*Amberboa leucantha* Coss. ex Batt. 176  
*Amberboa lippii* (L.) DC. 176  
*Amberboa sinaica* DC. 174  
*Amberboa tubuliflora* Murb. 176  
*Amberboi* Adans. 174  
**Ambrosia** L. 229  
**Ambrosia artemisiifolia** L. 230, 231  
**Ambrosia maritima** L. 230, 231  
*Amphidoxa* DC. 207  
**Anacyclus** L. 247  
*Anacyclus alexandrinus* Willd. 249  
**Anacyclus monanthos** (L.) Thell. 247  
subsp. *monanthos* 249, 248, 348  
**Anarrhinum** Desf. 59  
*Anarrhinum apterum* Vatke 69  
*Anarrhinum pedicellatum* T. Anderson 69  
**Anarrhinum pubescens** Fresen. 59, 57  
**Anthemis** L. 238  
*Anthemis arabica* Viv. 249  
**Anthemis arvensis** L. 242  
**Anthemis bornmuelleri** Stoj. & Acht.  
241, 240  
*Anthemis cairica* Vis. 241  
**Anthemis chia** L. 243, 244  
**Anthemis cotula** L. 239, 240  
*Anthemis deserti* Boiss. 245  
*Anthemis eliezrae* Eig 242  
*Anthemis galilaea* Eig 241  
*Anthemis garcinii* Burm.f. 222  
**Anthemis hebronica** Boiss. & Kotschy  
246, 244  
**Anthemis indurata** Delile 242, 240  
*Anthemis leucanthemifolia* Boiss. & Blanche  
242  
subsp. *philistea* (Boiss.) Eig 242  
subsp. *rafaensis* Eig 242  
*Anthemis libanotica* DC. 243  
**Anthemis melampodina** Delile 243  
subsp. *deserti* (Boiss.) Eig 245, 348  
subsp. *melampodina* 245, 244  
**Anthemis microsperma** Boiss. & Kotschy  
245, 244  
*Anthemis mixta* L. 247  
*Anthemis philistea* Boiss. 242  
**Anthemis pseudocotula** Boiss. 242, 240  
**Anthemis retusa** Delile 241, 240  
*Anthemis rotata* Boiss. 242  
**Anthemis scrobicularis** Yavin 246, 244  
**Anthemis zoharyana** Eig 245  
var. *zoharyana* 245, 244  
**Anticharis** Endl. 73  
**Anticharis arabica** Endl. 74, 75  
**Anticharis glandulosa** Asch. 73, 75  
**Anticharis linearis** (Benth.) Hochst. ex Asch.  
74, 75  
*Antirrhinum aegyptiacum* L. 65  
*Antirrhinum albifrons* Sm. 60  
*Antirrhinum chalepense* L. 61  
*Antirrhinum haelava* Forssk. 61  
*Antirrhinum heterophyllum* Schousb. 65  
*Antirrhinum micranthum* Cav. 60  
*Antirrhinum orontium* L. 69  
*Antirrhinum simplex* Willd. 63  
*Antirrhinum spurium* L. 68  
var. *integrifolium* Brot. 68  
*Antirrhinum tenue* Viv. 63

- Anvillea** DC. 222  
**Anvillea garcinii** (Burm.f.) DC. 222, 224, 346  
**Anvilleina** Maire 222  
**Apargia annua** Vis. 278  
**Artemisia** L. 258  
**Artemisia arragonensis** Lam. 261  
**Artemisia herba-alba** Asso 261  
     var. *tenuiflora* Boiss. 261  
**Artemisia inculta** Delile 261  
**Artemisia judaica** L. 259, 260, 340  
**Artemisia maderaspatana** L. 186  
**Artemisia monosperma** Delile 258, 256, 349  
**Artemisia scoparia** Waldst. & Kit.  
     259, 256, 350  
**Artemisia verlotiorum** Lamotte 261  
**Artemisia vulgaris** L. 259  
**Artemisiastrum** Rydb. 261  
**Askellia** W. A. Weber 299  
**Aster abyssinicus** Sch.Bip. 187  
**Aster crispus** Forssk. 221  
**Aster squamatus** (Spreng.) Hieron. 194  
**Aster subulatus** Michx. 194  
     var. *sandwicensis* (A. Gray) A. G. Jones  
     194  
**Asteriscus** Mill. 223  
**Asteriscus aquaticus** (L.) Less. 225  
     var. *pygmaeus* DC. 225  
**Asteriscus aquaticus** (L.) Less. 227  
**Asteriscus citriodorus** Heldr. & Hal. 227  
**Asteriscus graveolens** (Forssk.) Less. 226  
**Asteriscus hierochunticus** (Michon) Wiklund  
     225, 224, 346  
**Asteriscus Moench** 226  
**Asteriscus pygmaeus** (DC.) Coss. & Durieu  
     225  
**Asteriscus schimperi** (Boiss.) Boiss. 226  
**Asteriscus spinosus** (L.) Sch.Bip.  
     225, 224, 346  
**Asteropterus leyseroides** (Desf.) Rothm. 211  
**Asyneuma** Griseb. & Shenk. 132  
**Asyneuma rigidum** (Willd.) Grossh. 132  
     subsp. *sinaï* (A. DC.) Damboldt 132, 133  
**Atalanthus spinosus** (Forssk.) D. Don 291  
**Athanasia maritima** (L.) L. 250  
**Atractylis** L. 152  
**Atractylis aristata** Batt. 155  
**Atractylis boulosii** Täckh. 155  
**Atractylis cancellata** L. 155, 154, 338  
**Atractylis carduus** (Forssk.) C. Chr.  
     152, 151, 338  
     var. *angustifolia* Täckh. & Boulos 153  
     var. *carduus* 153  
     var. *latifolia* Täckh. & Boulos 153  
     var. *marmarica* Täckh. & Boulos 153  
     var. *glabrescens* (Boiss.) Täckh. & Boulos  
     153  
**Atractylis citrina** Coss. & Kralik 152  
**Atractylis flava** Desf. 152, 153  
     var. *citrina* (Coss. & Kralik) Muschl. 153  
     var. *glabrescens* Boiss. 153  
     var. *glabrescens* (Boiss.) Feinbr. 153  
**Atractylis mernepthae** Asch. 156, 154  
**Atractylis prolifera** Boiss. 155, 154  
**Atractylis serratuloides** Sieber ex Cass.  
     156, 154  
**Atropa physalodes** L. 43  
**Avicennia** L. 5  
**Avicennia marina** (Forssk.) Vierh. 5, 4, 321  
**Avicennia officinalis** sensu Klotzsch 5  
**AVICENNIACEAE** 5  
**Baccharis aegyptiaca** Forssk. ex DC. 189  
**Baccharis dioscoridis** L. 189  
**Bacopa** Aublet 76  
**Bacopa monnieri** (L.) Pennell 76, 75  
**Ballota** L. 25  
**Ballota damascena** Boiss. 25, 27  
**Ballota kaiseri** Täckh. 26  
**Ballota pseudodictamnus** (L.) Benth. 25, 27  
**Ballota saxatilis** C. Presl 26, 27  
**Ballota schimperi** Benth. 30  
**Ballota undulata** (Fresen.) Benth. 26, 27, 325  
**Balsamita** Mill. 255  
**Balsamita tridentata** Delile 253  
**Barkhausia aculeata** DC. 305  
**Barkhausia clausonii** Pomel 303  
**Barkhausia leucocephala** Bunge 306  
**Barkhausia senecioides** (Delile) Spreng. 303  
**Barleria** L. 100  
**Barleria acanthoides** Vahl 100, 98  
**Barleria hochstetteri** Nees 100, 98  
**Bartsia viscosa** L. 85  
**Berthelotia** DC. 189  
**Bidens** L. 234  
**Bidens acmella** (L.) Lam. 232  
**Bidens acutiloba** Sherff 236  
**Bidens bipinnata** L. 236, 235  
**Bidens pilosa** L. 234  
     var. *minor* (Bl.) Sherff 234  
**Bidens pilosa** L. 234, 235, 347  
**Bidens punctata** Sherff 236  
**Bidens schimperi** Sch.Bip. 236  
     var. *pilosa* Sch.Bip. ex Schweinf. & Asch.  
     236  
**Bidens schimperi** Sch.Bip. 236  
     var. *punctata* Sherff 236  
**Bidens schimperi** Sch.Bip. 236, 235  
**Bidens sudanica** Blume 234  
**Blainvillea** Cass. 232  
**Blainvillea acmella** (L.) Philipson 232, 228  
**Blainvillea alba** Edgew. 232  
**Blainvillea gayana** Cass. 232  
**Blainvillea hispida** Edgew. 232  
**Blainvillea latifolia** (L.f.) DC. ex Wight 232  
**Blainvillea polycephala** Gardner 232  
**Blainvillea racemosa** Gardner 232  
**Blainvillea rhomboidea** Cass. 232

- var. *lanceolata* (Poir.) DC. 232  
 var. *polycephala* (Gardner) Baker 233  
 var. *racemosa* (Gardner) Baker 233  
**Blepharis** Juss. 99  
**Blepharis attenuata** Napper 100, 98  
*Blepharis ciliaris* auct. mult. 99  
**Blepharis edulis** (Forssk.) Pers. 99, 98, 334  
*Blepharis hirta* (Nees) Martelli 100  
**Blepharis linariifolia** Pers. 100  
*Blumea abyssinica* Sch.Bip. ex A. Rich. 190  
*Blumea aurita* (L.f.) DC. 190  
*Blumea bovei* (DC.) Vatke 190  
*Blumea lyrata* (Kunth) Badillo 190  
*Bovea sinaica* Decne. 74  
*Brachyactis* Ledeb. 194  
*Brocchia* Vis. 257  
*Brocchia cinerea* (Delile) Vis. 257  
*Brotera* Spreng. 238  
*Bubonium* Hill 226  
*Buchnera asiatica* L. 85  
*Buchnera gesnerioides* Willd. 85  
*Buchnera hermonthica* Delile 84  
*Buchnera orobanchoides* R. Br. 85  
*Buphthalmum aquaticum* L. 227  
*Buphthalmum arabicum* Delile 222  
*Buphthalmum graveolens* Forssk. 226  
*Buphthalmum pratense* (Forssk.) Vahl 186  
*Buphthalmum spinosum* L. 225  
**Calendula** L. 266  
*Calendula aegyptiaca* Pers. 266  
**Calendula arvensis** L. 266, 268, 350  
*Calendula bicolor* Raf. 266  
*Calendula ceratosperma* Viv. 266  
*Calendula cristagalli* Viv. 266  
*Calendula gracilis* DC. 266  
*Calendula micrantha* Boiss. 266  
*Calendula persica* C. A. Mey. 266  
*Calendula platycarpa* Coss. 267  
**Calendula tripterocarpa** Rupr. 267, 268  
*Calyptocarpus burchellii* (Hook.) Sch.Bip. 232  
*Campanopsis campanuloides* (Delile) Kuntze 129  
*Campanopsis lobelioides* (L.f.) Kuntze 130  
**Campanula** L. 130  
*Campanula benthamii* Wall. ex Kit. 132  
*Campanula canescens* Wall. ex DC. 131  
*Campanula cervicina* (A. DC.) Dietrich 129  
**Campanula dimorphantha** Schweinf. 131, 133  
**Campanula dulcis** Decne. 131, 133  
**Campanula erinus** L. 131, 133  
*Campanula lobelioides* L.f. 130  
*Campanula mutabunda* Guss. 130  
*Campanula sinai* (A. DC.) Boiss. 132  
*Campanula speculum-veneris* L. 132  
**Campanula sulphurea** Boiss. 131, 133  
 CAMPANULACEAE 129  
*Capraria dissecta* Delile 76  
**Carduncellus** Adans. 181  
**Carduncellus eriocephalus** Boiss. 181, 180, 342  
**Carduncellus mareoticus** (Delile) Hanelt 181, 180, 342  
**Carduus** L. 147  
*Carduus arabicus* Jacq. ex Murray 150  
     subsp. *marmoratus* (Boiss. & Heldr.) Kazmi 150  
*Carduus arabicus* Jacq. ex Murray 150  
**Carduus argentatus** L. 149, 148  
*Carduus australis* L.f. 150  
**Carduus getulus** Pomel 149, 148, 338  
*Carduus marianus* L. 158  
*Carduus marmoratus* Boiss. & Heldr. 150  
*Carduus pseudosyriacus* Lojac 150  
**Carduus pycnocephalus** L. 149  
     subsp. *arabicus* (Jacq. ex Murray) Nyman 150  
     subsp. *pycnocephalus* 150, 148  
**Carduus pycnocephalus** L. 150  
     subsp. *breviphyllaris* P. H. Davis 150  
*Carduus syriacus* L. 150  
**Carlina** L. 147  
**Carlina involucrata** Poir. 147, 148  
**Carthamus** L. 177  
*Carthamus alexandrinus* (Boiss. & Heldr.) Bornm. 179  
**Carthamus glaucus** M. Bieb. 179  
     subsp. *alexandrinus* (Boiss. & Heldr.) Hanelt 179, 175  
     var. *alexandrinus* (Boiss. & Heldr.) Boiss. 179  
     var. *tenuis* (Boiss. & Blanche) Boiss. 179  
**Carthamus lanatus** L. 178, 175  
*Carthamus mareoticus* Delile 181  
**Carthamus nitidus** Boiss. 178, 175, 341  
**Carthamus tenuis** (Boiss. & Blanche) Bornm. 179  
     subsp. *foliosus* Hanelt 179  
*Celsia* L. 55  
*Celsia parviflora* Decne. 59  
*Cenia* Comm. ex Juss. 257  
**Centaurea** L. 162  
*Centaurea acaulis* Forssk. 165  
**Centaurea aegialophila** Wagenitz 172, 173  
**Centaurea aegyptiaca** L. 168, 169  
**Centaurea alexandrina** Delile 170, 171, 341  
**Centaurea ammocyanus** Boiss. 165, 164  
*Centaurea araneosa* Boiss. 170  
**Centaurea calcitrapa** L. 170, 171, 341  
*Centaurea carduus* Forssk. 152  
*Centaurea contracta* Viv. 165  
*Centaurea cretica* (Boiss. & Heldr.) Nyman 172  
*Centaurea crupinastrum* Moris 162  
*Centaurea crupinoides* Desf. 177  
**Centaurea dimorpha** Viv. 166, 167  
*Centaurea eriocephala* Boiss. & Reut. 166



- Centaurea eryngioides* Lam. 165, 164, 340  
*Centaurea furfuracea* Coss. & Durieu  
 166, 167  
*Centaurea glomerata* Vahl 165  
 var. *glabriceps* Asch. & Schweinf. 165  
*Centaurea glomerata* Vahl 165, 164  
*Centaurea kralikii* Boiss. 166  
*Centaurea lippii* L. 176  
*Centaurea melitensis* L. 168, 167  
*Centaurea pallescens* Delile 168, 169, 340  
*Centaurea postii* Boiss. 166, 167  
*Centaurea procurrens* Sieber ex Spreng.  
 170, 169, 340  
*Centaurea pullata* L. 172  
*Centaurea pumilio* L. 172, 173  
*Centaurea salmantica* L. 177  
*Centaurea scoparia* Sieber ex Spreng. 172, 173  
*Centaurea sinaica* DC. 168, 169, 340  
*Centaurea solstitialis* L. 166, 167  
*Cephalaria* Schrad. 122  
*Cephalaria syriaca* (L.) Schrad. 122, 124  
*Cephalostigma spathulatum* Thwaites 131  
*Ceratocephalus acmella* (L.) Kuntze 233  
*Cerelia* Adans. 185  
*Ceruana* Forssk. 186  
*Ceruana fruticosa* Less. 186  
*Ceruana pratensis* Forssk. 186, 184  
*Ceruana rotundifolia* Cass. 186  
*Ceruana senegalensis* DC. 186  
*Cervicina campanuloides* Delile 129  
*Chaenocephalus* Griseb. 237  
*Chaenostoma dissecta* (Delile) Thell. 76  
*Chamaemelum* Mill. 246  
*Chamaemelum auriculatum* Boiss. 251  
*Chamaemelum mixtum* (L.) All. 247, 248  
*Chamaepitys* Hill 34  
*Chamomilla aurea* (Loefl.) Coss. & Kralik 253  
*Charachera tetragona* Forssk. 2  
*Charachera viburnoides* Forssk. 2  
*Chartolepis* Cass. 162  
*Cheirolepis* Boiss. 162  
*Chiliadenus* Cass. 214  
*Chiliadenus candicans* (Delile) Brullo 216, 215  
*Chiliadenus iphionoides* (Boiss. & Blanche)  
 Brullo 217, 215  
*Chiliadenus montanus* (Vahl) Brullo 216, 215  
*Chlamydomphora* Ehrenb. ex Less. 253  
*Chlamydomphora tridentata* (Delile) Ehrenb. ex  
 Less. 253, 252  
*Chondrilla nudicaulis* L. 291  
*Chrysanthemum coronarium* L. 255  
*Chrysocoma candicans* Delile 216  
*Chrysocoma montana* Vahl 216  
*Chrysocoma mucronata* Forssk. 214  
*Chrysocoma spicata* Forssk. 197  
*Chrysocoma spicatum* (Forssk.) Vahl 197  
*Chrysocoma spinosa* (Vahl) Delile 214  
*Cichorium* L. 270  
*Cichorium ambiguum* Schult. 270  
*Cichorium calvum* Sch.Bip. ex Asch. 270  
*Cichorium divaricatum* Schousb. 270  
*Cichorium endivia* L. 270  
 subsp. *pumilum* (Jacq.) Cout. 270  
*Cichorium endivia* L. 270  
 subsp. *divaricatum* (Schousb.) P.D. Sell  
 270, 268, 351  
 var. *pumilum* (Jacq.) Vis. 270  
*Cichorium glandulosum* Boiss. & Heut. 270  
*Cichorium glaucum* Hoffmans. & Link 270  
*Cichorium intybus* L. 270  
 subsp. *pumilum* (Jacq.) Ball 270  
 var. *divaricatum* (Schousb.) DC. 270  
*Cichorium minimum* Port. 270  
*Cichorium noeanum* Boiss. 270  
*Cichorium polystachyum* Pomel 270  
*Cichorium pumilum* Jacq. 270  
*Cirsium syriacum* (L.) Gaertn. 150  
*Cistanche* Hoffmanns. & Link. 94  
*Cistanche ambigua* (Bunge) Beck 95  
*Cistanche lutea* (Desf.) Hoffmanns. & Link 95  
*Cistanche lutea* Wight 94  
*Cistanche phelypaea* (L.) Cout. 95, 334  
 subsp. *lutea* (Desf.) Fernier 95  
*Cistanche salsa* (C. A. Mey.) Beck 95  
*Cistanche tinctoria* (Forssk.) Beck 95  
*Cistanche tubulosa* (Schenk) Hook. f. 94, 91  
 var. *albiflora* (Gilli) Hadidy 95  
 var. *tubulosa* 95  
 forma *albiflora* Gilli 95  
*Cistanche violacea* (Desf.) Beck 96  
*Clerodendrum* L. 26  
*Clerodendrum acerbianum* (Vis.) Benth. &  
 Hook.f. 26, 27  
*Clinopodium fruticosum* Forssk. 30  
*Cnicus* L. 182  
*Cnicus benedictus* L. 182, 180  
*Cnicus syriacus* Roth 150  
 COMPOSITAE 134  
*Comptonanthus* B. Nord. 197  
*Conyza* Less. 192  
*Conyza aegyptiaca* (L.) Dryand. 193, 191  
*Conyza albida* Willd. ex Spreng. 194  
*Conyza ambigua* DC. 192  
*Conyza aurita* L.f. 190  
*Conyza bonariensis* (L.) Cronquist  
 192, 191, 342  
*Conyza bovei* DC. 190  
*Conyza canadensis* (L.) Cronquist 193, 191  
*Conyza dioscoridis* (L.) Desf. 189  
*Conyza lineariloba* DC. 193  
*Conyza linifolia* (Willd.) Täckh. 192  
*Conyza lyrata* Kunth 190  
*Conyza odora* Forssk. 189  
*Conyza pungens* Lam. 214  
*Conyza rupestris* L. 205  
*Conyza squamata* Spreng. 194

- Conyza stricta* Willd. 193, 191  
*Conyza triloba* Decne. 193  
*Conyza viscosa* Mill. 190  
*Conyzanthus squamatus* (Spreng.) Tamamsch. 194  
*Conyzanthus* Tamamsch. 194  
*Coreopsis acmella* (L.) Krause 233  
*Coridothymus capitatus* (L.) Rchb. f. 13  
**Cotula** L. 257  
*Cotula anthemoides* L. 257, 256  
*Cotula aurea* Loefl. 253  
*Cotula cinerea* Delile 257, 256, 349  
*Cotula microcephala* DC. 257  
*Cotula tridentata* (Delile) Dinsm. 253  
*Crassocephalum flavum* Decne. 262  
**Crepis** L. 299  
*Crepis aculeata* (DC.) Boiss. 305, 304  
*Crepis aegyptiaca* (Schweinf.) Täckh. & Boulos 308  
*Crepis aspera* L. 305, 304  
    var. *aspera* 305  
*Crepis bulbosa* (L.) Tausch 306  
**Crepis clausonis** (Pomel) Batt. & Trab. 303  
*Crepis hispidula* Delile 278  
*Crepis libyca* (Pamp.) Shab. 302, 301  
*Crepis micrantha* Czerep 300, 301  
*Crepis nigricans* Viv. 305, 304  
*Crepis nudiflora* Viv. 303  
*Crepis parviflora* Desf. ex Pers.  
*Crepis radicata* Forssk. 280, 303  
    var. *arabica* (Boiss.) Täckh. & Boulos 303  
*Crepis radicata* sensu auct. 303  
*Crepis sancta* (L.) Bornm. 302, 301, 352  
    subsp. *sancta* 302  
**Crepis senecioides** Delile 303, 301  
*Crepis taraxacifolia* Thuill. 302  
    var. *libyca* Pamp. 302  
*Crepis vesicaria* L. 302  
    var. *libyca* (Pamp.) Maire & Weiller 302  
**Crupina** (Pers.) DC. 161  
**Crupina crupinastrum** (Moris) Vis. 162, 164  
*Cyanopsis* Cass. 174  
**Cynara** L. 158  
**Cynara cornigera** Lindl. 158, 160  
*Cynara sibirorpiana* Boiss. & Heldr. 185  
*Cyrtolepis alexandrina* (Willd.) DC. 249  
**Datura** L. 46  
*Datura fastuosa* L. 46  
**Datura innoxia** Mill. 46, 45, 329  
**Datura metel** L. 46  
**Datura stramonium** L. 46, 45  
*Datura tatula* L. 46  
*Deckera nilotica* Sch.Bip. 283  
*Deckera* Sch.Bip. 279  
*Demidium* DC. 207  
*Dianthera paniculata* Forssk. 103  
**Dicoma** Cass. 182  
**Dicoma schimperi** (DC.) Baill. ex Hoffm. 183, 180  
**Dicoma tomentosa** Cass. 182, 180  
*Diotis maritima* (L.) Desf. 250  
*Diplostemma alatum* DC. 223  
**DIPSACACEAE** 122  
**Dittrichia** Greuter 212  
**Dittrichia graveolens** (L.) Greuter 212, 345  
**Dittrichia viscosa** (L.) Greuter 212, 210  
**Doellia** Sch.Bip. 190  
**Doellia bovei** (DC.) Anderb. 190, 188  
*Dracocephalum royleanum* Benth. 22  
**Ecbolium** Kurz 101  
*Ecbolium limmaeanum* sensu auct. 101  
**Ecbolium viride** (Forssk.) Alston 101, 102  
**Echinops** L. 145  
*Echinops creticus* Boiss. & Heldr. 146  
**Echinops galalensis** Schweinf. 147  
**Echinops glaberrimus** DC. 145, 144, 336  
**Echinops hussonii** Boiss. 145, 144, 337  
**Echinops macrochaetus** Fresen. 146  
**Echinops spinosus** L. 146, 144, 337  
*Echinops spinosus* Sm. 146  
**Echinops taeckholmiana** Amin 146  
*Echinops viscosus* DC. 146  
**Eclipta** L. 230  
*Eclipta alba* (L.) Hassk. 230  
*Eclipta latifolia* L.f. 232  
*Eclipta marginata* Hochst. & Steud. ex Boiss. 230  
**Eclipta prostrata** (L.) L. 230, 231, 347  
*Elatinoides* (Chav.) Wettst. 63  
*Elatinoides aegyptiaca* (L.) Wettst. 65  
**Endoptera** DC. 299  
**Eremostachys** Bunge 30  
**Eremostachys laciniata** (L.) Bunge 30, 32  
*Erigeron aegyptiacum* L. 193  
*Erigeron bonariensis* L. 192  
*Erigeron bovei* (DC.) Boiss. 190  
*Erigeron canadense* L. 193  
*Erigeron crispus* Pourr. 192  
*Erigeron graveolens* L. 212  
*Erigeron inuloides* Poir. 220  
*Erigeron linifolium* Willd. 192  
*Erigeron serratum* Forssk. 193  
*Erigeron siculum* L. 219  
*Erigeron trilobum* (Decne.) Boiss. 193  
*Erigeron viscosum* L. 212  
**Ethulia** L.f. 183  
*Ethulia bidentis* L. 238  
**Ethulia conyzoides** L.f. 183, 184  
    subsp. *conyzoides* 183  
*Eufragia* Griseb. 85  
*Eufragia viscosa* (L.) Benth. 85  
*Eupatorium chilense* Molina 238  
*Evax* Gaertn. 198  
*Evax contracta* Boiss. 199

- Evax mauritanica* Pomel 199  
 var. *cyrenaica* Pamp. 199
- Eyrea* F. Muell. 189
- Felicia* Cass. 187
- Felicia dentata* (A. Rich.) Dandy 187  
 subsp. *dentata* 187, 188
- Felicia richardii* Vatke 187
- Filaginella* Opiz 207
- Filaginella uliginosa* (L.) Opiz 208
- Filago* L. 198
- Filago contracta* (Boiss.) Chrtek & Holub  
 199, 196, 343
- Filago desertorum* Pomel 199, 196, 343
- Filago germanica* L. 200  
 subsp. *prolifera* (Pomel) Maire 199  
 var. *pyramidata* (Gaudin.) DC. 200  
 var. *spathulata* (C. Presl) DC. 200
- Filago mareotica* Delile 200, 196  
 var. *floribunda* (Pomel) Maire 200
- Filago maritima* L. 250
- Filago prolifera* Pomel 199
- Filago prolifera* Pomel 199  
 subsp. *taeckholmiana* Chrtek 199
- Filago pyramidata* L. 200
- Filago spathulata* C. Presl 199, 200  
 forma *desertorum* (Pomel) Pamp. 199
- Filago spathulata* C. Presl 200
- Fimbristima* Raf. 194
- Flaveria* Juss. 238
- Flaveria bidentis* (L.) Kuntze 238, 235
- Flaveria bonariensis* DC. 238
- Flaveria contrayerba* (Cav.) Pers. 238
- Francoeuria* Cass. 217
- Francoeuria crispa* (Forssk.) Cass. 221
- Francoeuria undulata* (L.) Lack 221
- Franseria* Cav. 229
- Galinsoga* Ruiz & Pav. 233
- Galinsoga parviflora* Cav. 234, 228
- Garhadiolus* Jaub. & Spach 273
- Garhadiolus angulosus* Jaub. & Spach  
 273, 274
- Garhadiolus hedypnois* (Fisch. & C. A. Mey.)  
 Jaub. & Spach. 273
- Geigeria* Griess. 223
- Geigeria alata* (DC.) Benth. & Hook. ex Oliv.  
 & Hiern 223, 224
- Geigeria macdougallii* S. Moore 223
- Geropogon* L. 286
- Geropogon glabrum* L. 286
- Geropogon hybridus* (L.) Sch. Bip. 286, 284
- Gifolaria mareotica* (Delile) Chrtek & Holub  
 200
- Glebionis* Cass. 255
- Glebionis coronaria* (L.) Tzvelev  
 255, 252, 349
- Globularia* L. 96
- Globularia alypum* L. 97, 98
- Globularia alypum* L. 97  
 var. *arabica* (Jaub. & Spach) Cavara &  
 Grande 97
- Globularia arabica* Jaub. & Spach. 97, 98
- Globularia eriocephala* Pomel 97
- LOBULARIACEAE 96
- Gnaphalium* L. 207
- Gnaphalium multicaule* Willd. 208
- Gnaphalium niliacum* Spreng. 208
- Gnaphalium conglobatum* Viv. 209
- Gnaphalium crispatum* Delile 207
- Gnaphalium indicum* sensu auct. 208
- Gnaphalium leyseroides* Desf. 211
- Gnaphalium luteoalbum* L. 207
- Gnaphalium muscoides* Desf. 201
- Gnaphalium orientale* L. 209
- Gnaphalium polycaulon* Pers. 208, 206
- Gnaphalium pulvinatum* Delile 205
- Gnaphalium rueppellii* Fresen. 198
- Gnaphalium spathulatum* Delile 208
- Gnaphalium uliginosum* L. 208, 206
- Grangea* Adans. 186
- Grangea adansonii* Cass. 186
- Grangea aegyptiaca* (Jacq.) DC. 186
- Grangea maderaspatana* (L.) Poir. 186, 184
- Grantia* Boiss. 213
- Gratiola parviflora* Roxb. 86
- Grossheimia* Sosn. & Takht. 162
- Gundelia* L. 143
- Gundelia tournefortii* L. 143, 144, 336
- Gymnarrhena* Desf. 200
- Gymnarrhena micrantha* Desf. 201, 202, 344
- Gymnocline* Cass. 255
- Hedyotis maritima* L.f. 77
- Hedypnois* Mill. 272
- Hedypnois coronopifolia* Ten. 272
- Hedypnois crepidiformis* Rchb. 272
- Hedypnois cretica* (L.) Dum. Cours. 272
- Hedypnois globulifera* Lam. 272
- Hedypnois monspeltensis* Willd. 272
- Hedypnois pendula* Willd. 272
- Hedypnois polymorpha* DC. 272
- Hedypnois rhagadioloides* (L.) F. W. Schmidt  
 272, 274
- Hedypnois sabulorum* Pomel 272
- Hedypnois tubiformis* Ten. 272
- Helichrysum* Mill. 208
- Helichrysum conglobatum* (Viv.) Steud.  
 209, 210
- Helichrysum glumaceum* DC. 209, 210
- Helichrysum orientale* (L.) Gaertn. 209, 210
- Helichrysum siculum* Boiss. 209
- Helminthia echioides* (L.) Gaertn. 279
- Helminthia* Juss. 279
- Helminthotheca* Vaill. ex Zinn 279
- Helminthotheca echioides* (L.) Holub  
 279, 277
- Hemipappus* K. Koch 255
- Heterachaena massauensis* Fresen. 293

- Heteroderis** (Bunge) Boiss. 306  
*Heteroderis aegyptiaca* Schweinf. 308  
*Heteroderis leucocephala* (Bunge) Leonova 308  
**Heteroderis pusilla** (Boiss.) Boiss. 306  
   var. *leucocephala* (Bunge) Rech. f. 306, 307  
*Heteroderis stocksiana* Boiss. 306  
*Hieraceum sanctum* L. 302  
*Hieracium simplex* Viv. 276  
*Hieracium sprengerianum* sensu auct. 283  
*Hiorthia alexandrina* (Willd.) Less. 249  
*Hirschia* Baker 213  
*Hochstetteria* DC. 182  
*Hochstetteria schimperi* DC. 183  
*Hoehnelia* Schweinf. 183  
**Homognaphalium** Kirp. 205  
*Homognaphalium* Fayed & Zareh 205  
**Homognaphalium crispatum** (Delile) Kirp. 207, 206  
**Homognaphalium pulvinatum** (Delile) Fayed & Zareh 205, 206  
*Hyalea* (DC.) Jaub. & Spach 162  
**Hyoscyamus** L. 48  
**Hyoscyamus albus** L. 50, 51  
*Hyoscyamus albus* L. 50  
   var. *desertorum* Asch. ex Boiss. 50  
**Hyoscyamus aureus** L. 52, 51, 330  
**Hyoscyamus boveanus** (Dunal) Asch. & Schweinf. 50, 49, 330  
*Hyoscyamus cylindrocalyx* Rech. f. 50  
*Hyoscyamus datora* Forssk. 50  
**Hyoscyamus desertorum** (Asch. ex Boiss.) Täckh. 50, 49, 330  
**Hyoscyamus muticus** L. 50, 49, 329  
**Hyoscyamus pusillus** L. 48, 47  
**Hyoscyamus reticulatus** L. 48, 47  
**Hyoseris** L. 271  
*Hyoseris cretica* L. 272  
*Hyoseris hedynois* L. 272  
*Hyoseris lucida* L. 271  
**Hyoseris radiata** L. 271  
   subsp. *graecca* Halácsy 271, 274  
*Hyoseris rhagadioloides* L. 272  
**Hyoseris scabra** L. 271, 274  
*Hypelichrysum* Kirp. 207  
**Ifloga** Cass. 197  
**Ifloga labillardierei** (Pamp.) Fayed & Zareh 198  
   subsp. *hadidii* Fayed & Zareh 198  
   subsp. *labillardierei* 198  
*Ifloga rueppellii* (Fresen.) Danin 198  
**Ifloga spicata** (Forssk.) Sch.Bip. 197, 196, 343  
   subsp. *albescens* Chrtek 198  
   subsp. *elbaensis* Chrtek 198  
   subsp. *spicata* 198  
*Ifloga spicata* (Forssk.) Sch.Bip. 198  
   var. *labillardieri* Pamp. 198  
*Inula arabica* L. 221  
*Inula crispa* (Forssk.) Pers. 221  
*Inula crithmoides* L. 211  
*Inula graveolens* (L.) Desf. 212  
*Inula incisa* Lam. 219  
*Inula pulicaria* L. 220  
*Inula undulata* L. 221  
*Inula undulata* sensu Delile 219  
*Inula viscosa* (L.) Aiton 212  
**Iphiona** Cass. 213  
**Iphiona mucronata** (Forssk.) Asch. & Schweinf. 214, 215, 345  
**Iphiona scabra** DC. 214, 215, 345  
**Jamesbrittenia** Kuntze 76  
**Jamesbrittenia dissecta** (Delile) Kuntze 76, 75  
*Jasonia candicans* (Delile) Botsch. 216  
*Jasonia discooides* Cass. 219  
*Jasonia iphionoides* (Boiss. & Blanche) Botsch. 217  
*Jasonia montana* (Vahl) Botsch. 216  
*Jasonia sicula* (L.) DC. 219  
**Justicia** L. 103  
**Justicia heterocarpa** T. Anderson 103  
   subsp. *heterocarpa* 103, 102  
*Justicia kotschyi* (Hochst.) Dandy 103  
**Justicia ladanoides** Lam. 103, 102  
*Justicia schimperi* (Hochst.) Dandy 103  
   var. *kotschyi* (Hochst.) J. K. Morton 103  
*Justicia viridis* Forssk. 101  
*Kalbfussia* Sch.Bip. 276  
*Kalbfussia hispidula* (Delile) Bég. & Vacc. 278  
*Kentrophyllum alexandrinum* Boiss. & Heldr. 179  
*Kentrophyllum* DC. 177  
*Kentrophyllum tenue* Boiss. & Blanche 179  
**Kickxia** Dumort. 63  
**Kickxia acerbiana** (Boiss.) Täckh. & Boulos 68, 67  
**Kickxia aegyptiaca** (L.) Nábelek 65, 333  
   subsp. *aegyptiaca* 66, 67  
**Kickxia elatine** (L.) Dumort. 66  
   subsp. *erinita* (Mabille) Greuter 66, 67  
**Kickxia floribunda** (Boiss.) Täckh. & Boulos 66, 67, 333  
**Kickxia hastata** (R. Br. ex Benth.) Dandy 64, 67  
**Kickxia heterophylla** (Schousb.) Dandy 65, 67  
*Kickxia kneuckeri* (Bornm.) Täckh. & Boulos 68  
**Kickxia macilenta** (Decne.) Danin 64  
*Kickxia nubica* (Skan) Dandy 68  
*Kickxia scariosepala* Täckh. & Boulos 68  
**Kickxia scoparia** (Spreng) Kunkel 65, 332  
*Kickxia spartioides* (Brouss. ex Buch) Janch. 65  
**Kickxia spuria** (L.) Dumort. 68, 67  
   subsp. *integrifolia* (Brot.) R. Fernandes 68  
*Knautia plumosa* L. 126  
**Koelpinia** Pall. 273  
**Koelpinia linearis** Pall. 273, 274, 351

- Kopsia aegyptiaca* (Pers.) Caruel 92  
*Kopsia lavandulacea* (Rchb.) Caruel 89  
*Kopsia longiflora* (Pers.) Dumort. 90  
*Kopsia mutelii* (F. W. Schultz) Bég. 89  
*Kopsia nana* (Reut.) Freyn ex Freyn & Brandis 88  
*Kopsia ramosa* (L.) Dumort. 87  
var. *mutelii* (F. W. Schultz) Caruel 89  
*Kopsia schultzei* (Mutel) Bég. 90  
var. *typica* Bég. 90  
*Kuhnia arabica* DC. 213  
LABIATAE 6  
*Lactuca* L. 313  
*Lactuca fragilis* Asso 297  
*Lactuca massauensis* (Fresen.) Sch.Bip. ex A. Rich. 293  
*Lactuca orientalis* (Boiss.) Boiss. 315  
*Lactuca saligna* L. 313, 314  
*Lactuca scariola* L. 315  
*Lactuca serriola* L. 315, 314  
*Lactuca undulata* Ledeb. 313, 314  
*Laggera aurita* (L.f.) C. B. Clarke 190  
*Lagoseris* M. Bieb. 299  
*Lagoseris bifida* (Vis.) Koch 302  
*Lallemantia* Fisch. & Mey. 22  
*Lallemantia royleana* (Benth.) Benth. 22, 23  
*Lamium* L. 24  
*Lamium amplexicaule* L. 24, 23, 325  
*Lantana* L. 1  
*Lantana aculeata* L. 1  
*Lantana antidotalis* Schumach. & Thonn. 1  
*Lantana camara* L. 1, 321  
var. *aculeata* (L.) Mold. 1  
*Lantana rugosa* sensu Täckh. 2  
*Lantana salviifolia* sensu Baker, sensu Täckh. 2  
*Lantana viburnoides* (Forssk.) Vahl 2, 4  
*Lapsana koelpiniae* L.f. 273  
*Lapsana stellata* L. 275  
*Lasallea* Greene 194  
*Lasiopogon* Cass. 201  
*Lasiopogon muscoides* (Desf.) DC. 201, 202  
*Lasiospermum* Lag. 254  
*Lasiospermum brachyglossum* DC. 254, 252  
*Lathraea phelipaea* Forssk. 90  
*Lathraea phelypaea* L. 95  
*Launaea* Cass. 290  
*Launaea amal-aminiae* N. Kilian 295, 296  
*Launaea angustifolia* (Desf.) Kuntze 295  
subsp. *arabica* (Boiss.) N. Kilian 295, 296  
*Launaea arabica* (Boiss.) H. Lindb. 295  
*Launaea capitata* (Spreng.) Dandy 294, 292, 351  
*Launaea cassiniana* (Boiss.) Kuntze 295  
var. *marginata* Maire 295  
*Launaea cassiniana* (Jaub. & Spach) Kuntze 298  
*Launaea chondrilloides* (Desf.) Hook. f. 297  
*Launaea foxii* (Post) Eig 295  
*Launaea fragilis* (Asso) Pau 297  
subsp. *fragilis* 297, 296, 352  
*Launaea glomerata* (Cass.) Hook. f. 294  
*Launaea massauensis* (Fresen.) Sch.Bip. ex Kuntze 293, 292  
*Launaea mucronata* (Forssk.) Muschl. 297  
subsp. *mucronata* 298, 296  
subsp. *cassiniana* (Jaub. & Spach) N. Kilian 298  
*Launaea nudicaulis* (L.) Hook. f. 291, 292, 351  
*Launaea procumbens* (Roxb.) Lack 294  
*Launaea procumbens* (Roxb.) Ramayya & Rajagopal 293, 292  
*Launaea procumbens* sensu Alavi 295  
*Launaea resedifolia* 297  
subsp. *mucronata* (Forssk.) Maire 297  
*Launaea resedifolia* sensu auct. mult. 297  
var. *pulchella* Pamp. 298  
*Launaea spinosa* (Forssk.) Sch.Bip. ex Kuntze 291, 292  
*Launaea tenuiloba* (Boiss.) Kuntze 297  
*Laurentia etbaica* Schweinf. 130  
*Lavandula* L. 8  
*Lavandula atriplicifolia* Benth. 9, 10  
*Lavandula canescens* Deflers 9  
*Lavandula coronopifolia* Poir. 11, 10, 321  
*Lavandula multifida* L. 9, 10  
*Lavandula pubescens* Decne. 9, 10  
*Lavandula stricta* Delile 11  
*Legousia* Durande 132  
*Legousia speculum-veneris* (L.) Chaix 132, 133  
LENTIBULARIACEAE 106  
*Leontodon* L. 276  
*Leontodon bulbosus* L. 306  
*Leontodon coronopifolium* Desf. 280  
*Leontodon creticus* Boiss. 278  
*Leontodon hispidulus* (Delile) Boiss. 278  
var. *tenuiloba* Boiss. 278  
*Leontodon hispidulus* (Delile) Boiss. 278, 277  
*Leontodon laciniatus* (Bertol.) Widder 278, 277  
*Leontodon minimum* Guss. 316  
*Leontodon mucranatum* Forssk. 297  
*Leontodon simplex* (Viv.) Widder 276, 277  
*Leontodon tuberosus* L. 278, 277  
*Leontonyx* Cass. 208  
*Leucas* R. Br. 28  
*Leucas inflata* Benth. 28, 27  
*Leucas neuffizeana* Courbai 28, 27  
*Leucas urticifolia* (Vahl) R. Br. 29, 27  
*Leysera* L. 211  
*Leysera capillifolia* (Willd.) DC. 211  
*Leysera leyseroides* (Desf.) Maire 211, 210  
*Limbarda* Adans. 211  
*Limbarda crithmoides* (L.) Dumort. 211, 210, 344  
*Limosella* L. 77

- Limosella aquatica** L. 77, 75  
**Linaria** L. 59  
*Linaria acerbiana* Boiss. 68  
*Linaria aegyptiaca* (L.) Dum.Cours. 65  
   subsp. *eu-aegyptiaca* Maire 66  
   var. *heterophylla* Bornm. 66  
**Linaria albifrons** (Sm.) Spreng. 60, 62  
**Linaria chalepensis** (L.) Mill. 61, 62  
*Linaria floribunda* Boiss. 66  
**Linaria haelava** (Forssk.) Delile 61, 62, 332  
*Linaria hastata* R. Br. ex Benth. 64  
*Linaria hellenica* Turrill 63  
**Linaria joppensis** Bornm. 61, 62  
*Linaria kneuckeri* Bornm. 68  
*Linaria macilenta* Decne. 64  
**Linaria micrantha** (Cav.) Hoffmanns. & Link  
   60, 62  
*Linaria nubica* Skan 68  
*Linaria scoparia* Spreng. 65  
**Linaria simplex** Desf. 63, 62  
*Linaria simplex* (Willd.) DC. 63  
*Linaria spartioides* Brouss. ex Buch 65  
**Linaria tenuis** (Viv.) Spreng. 63, 62  
**Lindenbergia** Lehm. 74  
*Lindenbergia abyssinica* Hochst. ex Benth. 74  
**Lindenbergia indica** (L.) Vatke 74, 75  
*Lindenbergia sinaica* (Decne.) Benth. 74  
**Lindernia** All. 86  
**Lindernia parviflora** (Roxb.) Haines 86, 83  
*Linosyris candicans* (Delile) DC. 216  
*Lippia nodiflora* (L.) Michx 3  
*Lomatolepis glomerata* Cass. 294  
*Lomatolepis nudicaulis* (L.) Cass. 291  
*Lomelosia aucheri* (Boiss.) Greuter & Burdet  
   125  
*Lomelosia olivieri* (Coul.) Greuter & Burdet  
   125  
*Lomelosia palaestina* (L.) Greuter & Burdet  
   123  
*Longchampia capillifolia* Willd. 211  
**Lycium** L. 43  
**Lycium arabicum** Schweinf. ex Boiss. 44  
*Lycium aschersohnii* Dammer 44  
*Lycium barbarum* L. 44  
   var. *brevilobum* Post 44  
**Lycium europaeum** L. 44, 42, 329  
   var. *ramulosum* (Dunal) Fiori 44  
*Lycium mediterraneum* Dunal 44  
   var. *cinnamomeum* Dunal 44  
   var. *leucocladum* Dunal 44  
**Lycium schweinfurthii** Dammer 44, 42  
   var. *schweinfurthii* 44  
   var. *aschersohnii* (Dammer) Feinbrun 44  
**Lycium shawii** Roem. & Schult. 44, 42  
*Lysimachia monnieri* L. 76  
**Mantisalca** Cass. 177  
**Mantisalca salmantica** (L.) Briq. & Cavill.  
   177, 175  
*Mantisalca duriaei* (Spach) Briq. & Cavill. 177  
**Marrubium** L. 22  
**Marrubium alysson** L. 22, 23, 324  
*Marrubium pseudodictamnus* L. 25  
*Marrubium undulatum* Fresen. 26  
**Marrubium vulgare** L. 24, 23, 324  
**Matricaria** L. 251  
**Matricaria aurea** (Loefl.) Sch.Bip. 253, 252  
*Matricaria chamomilla* L. 251  
   var. *coronata* Boiss. 253  
**Matricaria recutita** L. 251  
   var. *coronata* (Boiss.) Fertig 253  
   var. *recutita* 253, 252  
*Melanoloma* Cass. 162  
*Melanoloma pullatum* (L.) Fourr. 172  
*Melitella* Sommery 299  
**Mentha** L. 11  
*Mentha lavandulacea* Willd. 11  
**Mentha longifolia** (L.) Huds. 11  
   subsp. *schimperii* (Briq.) Briq. 12, 10  
   subsp. *typhoides* (Briq.) Harley 11, 10, 322  
**Mentha pulegium** L. 11, 10  
*Mentha spicata* L. 11  
   var. *longifolia* L. 11  
*Mentha sylvestris* L. 11  
   subsp. *typhoides* Briq. 11  
*Mesoligis* Raf. 194  
*Microderis* DC. 276  
*Microlecan* (Sch.Bip.) Benth. 234  
*Microlonchus* Cass. 177  
*Microlonchus duriaei* Spach 177  
*Microlonchus salmanticus* (L.) DC. 177  
**Micromeria** Benth. 14  
*Micromeria biflora* (Buch.-Ham. ex D. Don)  
   Benth. 16  
**Micromeria imbricata** (Forssk.) C. Chr.  
   16, 15  
**Micromeria myrtifolia** Boiss. & Hohen. 16, 15  
**Micromeria nervosa** (Desf.) Benth.  
   16, 15, 322  
**Micromeria serbaliana** Danin & Hedge 14  
**Micromeria sinaica** Benth. 14, 15  
*Microrhynchus* Lees. 290  
*Microrhynchus arabicus* Jaub. & Spach 294  
*Microrhynchus fallax* Jaub. & Spach 293  
*Microrhynchus glomeratus* (Cass.) Jaub. &  
   Spach 294  
*Microrhynchus nudicaulis* (L.) Less. 291  
*Milleria chiloensis* Juss. 238  
*Milleria contrayerba* Cav. 238  
**Misopates** Rafin. 69  
**Misopates microcarpum** (Pomel) D. A. Sutton  
   70  
**Misopates orontium** (L.) Rafin. 69, 71  
*Myscolus* Cass. 269  
*Nanorrhinum hastatum* (Benth.) Ghebrehiwet  
   63  
*Nanorrhinum heterophyllum* (Schousb.)  
   Ghebrehiwet 63  
*Nanorrhinum macilentum* (Decne.) Betsche 63

- Nauenbergia* Willd. 238  
*Nauplius* Cass. 226  
*Nauplius aquaticus* (L.) Cass. 227, 224  
*Nauplius graveolens* (Forssk.) Wiklund  
 226, 224, 347  
     subsp. *graveolens* 226  
*Nemauchenis* Cass. 299  
*Nepeta* L. 21  
*Nepeta septemcrenata* Benth. 21, 23, 324  
*Nicandra* Adans. 43  
*Nicandra physalodes* (L.) Gaertn. 43  
*Nicandra physalodes* (L.) Scopoli 43, 42  
*Nicotiana* L. 52  
*Nicotiana glauca* R. C. Graham 52, 53, 331  
*Nicotiana plumbaginifolia* Viv. 54, 53  
*Nicotiana rustica* L. 52  
*Notobasis* (Cass.) Cass. 150  
*Notobasis syriaca* (L.) Cass. 150, 151, 338  
*Ocimum* L. 7  
*Ocimum forsskaolii* Benth. 8, 10  
*Ocimum hadiense* sensu Boulos 8  
*Ocimum menthifolium* Hochst. ex Benth. 8  
*Odontospermum aquaticum* (L.) Sch.Bip. 227  
*Odontospermum graveolens* (Forssk.) Sch.Bip.  
 226  
*Odontospermum pygmaeum* (DC.) O. Hoffm  
 225  
*Oldenlandia maritima* (L.f.) Roth 77  
*Oligogyne burchellii* Hook.f. 232  
*Omalotheca* Cass. 207  
*Onopordum* L. 159  
*Onopordum alexandrinum* Boiss.  
 159, 160, 339  
*Onopordum ambiguum* Fresen.  
 161, 160, 339  
*Oporina laciniata* Betol. 278  
*Oporinia hispidula* (Delile) DC. 278  
*Origanum* L. 12  
*Origanum isthmicum* Danin 12  
*Origanum maru* L. 12  
     var. *sinaicum* Boiss. 12  
*Origanum syriacum* L. 12  
     subsp. *sinaicum* (Boiss.) Greuter & Burdet  
 12, 15, 322  
*Ormenis* (Cass.) Cass. 246  
*Ormenis mixta* (L.) Dumort. 247  
 OROBANCHACEAE 86  
*Orobanche* L. 87  
*Orobanche abyssinica* A. Rich. 93  
*Orobanche aegyptiaca* Pers. 92  
     var. *aemula* (Beck) Beck 92  
     var. *typica* forma *aemula* Beck 92  
*Orobanche aegyptiaca* Pers. 90, 91  
*Orobanche angustisepala* F. W. Schultz 92  
*Orobanche apiculata* Wallr. 93  
*Orobanche cernua* Loefl. 93, 91, 334  
     forma *desertorum* Beck 93  
     var. *desertorum* (Beck) Stapf 93  
     var. *nepalensis* Reut. 93  
*Orobanche crenata* Forssk. 92, 91  
     var. *silvestris* (Beck) Beck 92  
     var. *typica* forma *silvestris* Beck 92  
*Orobanche curviflora* Viv. 93  
*Orobanche delilii* Decne. 90  
*Orobanche grisebachii* Reut. 93  
*Orobanche indica* Buch.-Ham. 90  
*Orobanche lavandulacea* Rchb. 89  
*Orobanche minor* Sm. 93  
     var. *grisebachii* (Reut.) Hadidy 93  
     var. *minor* 93  
     var. *pubescens* (d'Urv.) Meikle 94  
*Orobanche mutelii* F. W. Schultz 89  
*Orobanche nana* (Reut.) Noë ex Beck 88  
*Orobanche nicotianae* Wight 93  
*Orobanche palaestina* Reut. 94  
*Orobanche pedunculata* Viv. 90  
*Orobanche pelargonii* Caldesi 92  
*Orobanche phelypaea* (L.) Wallr. 95  
*Orobanche phelypaea* Willd. 96  
*Orobanche pruinosa* Lapeyr. 92  
*Orobanche pubescens* d'Urv. 94  
*Orobanche ramosa* L. 87, 91  
     subsp. *mutelii* (F. W. Schultz) Cout. 89  
     var. *brevispicata* (Ledeb.) R. A. Graham 89  
     var. *mutelii* (F. W. Schultz) Fiori 89  
     var. *nana* (Reut.) Fiori 88  
     var. *ramosa* 88  
     var. *schweinfurthii* (Beck) Hadidy 88  
*Orobanche ramosa* Vahl 90  
*Orobanche salsa* (C. A. Mey.) Kuntze 95  
*Orobanche schultzii* Mutel 90, 91  
     forma *pyramidalis* (Reut.) Beck 90  
     var. *alexandrina* Beck 90  
*Orobanche schweinfurthii* Beck 88  
*Orobanche speciosa* DC. 92  
     var. *pelargonii* (Caldesi) Arcang. 92  
*Orobanche tinctoria* Forssk. 95  
*Orobanche versicolor* F. W. Schultz 94  
*Orobanche violacea* (Desf.) Wallr. 96  
*Orthosiphon* Benth. 8  
*Orthosiphon pallidus* Royle ex Benth. 8, 10  
*Osteospermum* L. 267  
*Osteospermum vaillantii* (Decne.) Norl.  
 267, 268  
*Otanthus* Hoffmanns. & Link 250  
*Otanthus maritimus* (L.) Hoffmanns. & Link  
 250, 248  
*Otochlamys* DC. 257  
*Otostegia* Benth. 30  
*Otostegia fruticosa* (Forssk.) Penz. 30  
     subsp. *fruticosa* 30, 32  
     subsp. *schimperii* (Benth.) Sebald 30  
*Otostegia kaiseri* Täckh. 30  
*Otostegia schimperii* (Benth.) Boiss. 30  
*Palaeocyanus* Dostál 162  
*Pallenis* Cass. 223

- Pallenis spinosa* (L.) Cass. 225  
**Parentucellia** Viv. 85  
**Parentucellia viscosa** (L.) Caruel 85, 83  
**PEDALIACEAE** 104  
**Pedaliium** L. 106  
**Pedaliium murex** L. 106, 105  
**Pegolettia** Cass. 213  
**Pegolettia senegalensis** Cass. 213, 215  
**Peplidium** Delile 77  
*Peplidium humifusum* Delile 77  
**Peplidium maritimum** (L.f.) Asch. 77, 75  
**Peristrophe** Nees 103  
*Peristrophe bicalyculata* (Retz.) Ness 103  
**Peristrophe paniculata** (Forssk.) Brummitt 103, 102  
*Perralderiopsis* Rauschert  
*Phaecasium* Cass. 299  
*Phaenopus orientalis* Boiss. 315  
*Phaeopappus* Boiss. 162  
*Phaeopappus scoparius* (Sieber ex Spreng.) Boiss. 172  
**Phagnalon** Cass. 201  
*Phagnalon aegyptiacum* Boiss. 204  
**Phagnalon barbeyanum** Asch. & Schweinf. 204, 202  
**Phagnalon nitidum** Fresen. 203  
**Phagnalon rupestre** (L.) DC. 205, 202, 344  
**Phagnalon schweinfurthii** Sch.Bip. ex Schweinf. 204, 202  
**Phagnalon sinaicum** Bornm. & Kneuck. 203, 202  
*Phalacroderis* DC. 299  
*Phelipaea aegyptiaca* (Pers.) Walp. 90  
var. *delilii* (Decne.) Reut. 90  
*Phelipaea ambigua* Bunge 95  
*Phelipaea delilii* (Decne.) Walp. 90  
*Phelipaea indica* (Buch.-Ham.) G. Don 90  
*Phelipaea lavandulacea* (Rchb.) Pomel 89  
*Phelipaea lavandulacea* (Rchb.) Reut. 89  
*Phelipaea longiflora* (Pers.) C. A. Mey. 90  
*Phelipaea lutea* Desf. 95  
*Phelipaea mutelii* (F. W. Schultz) Reut. 89  
var. *nana* Reut. 88  
*Phelipaea nana* (Reut.) Rchb. f. 88  
*Phelipaea pedunculata* (Viv.) Walp. 90  
*Phelipaea pulchella* C. A. Mey. 90  
*Phelipaea pyramidalis* Reut. 90  
*Phelipaea ramosa* (L.) C. A. Mey. 87  
subsp. *mutelii* (F. W. Schultz) Rouy 89  
var. *brevispicata* Ledeb. 89  
var. *grandiflora* Ledeb. 92  
var. *mutelii* (F. W. Schultz) Boiss. 89  
var. *nana* (Reut.) Boiss. 88  
*Phelipaea salsa* C. A. Mey. 95  
*Phelipaea schultzii* (Mutel) Walp. 90  
*Phelipaea tinctoria* (Forssk.) Brot. 95  
*Phelipaea tubulosa* Schenk 94  
*Phelipaea violacea* Desf. 96  
*Phelipanche aegyptiaca* (Pers.) Pomel 92  
*Phelipanche mutelii* (F. W. Schultz) Pomel 89  
*Phelipanche ramosa* (L.) Pomel 87  
*Phelipanche schultzii* (Mutel) Bég. 90  
*Phelipanche schweinfurthii* (Beck) Soják 88  
**Phlomis** L. 29  
**Phlomis aurea** Decne. 29, 32  
**Phlomis floccosa** D. Don 29, 32, 325  
*Phlomis laciniata* L. 30  
*Phlomis urticifolia* Vahl 29  
**Phyla** Lour. 3  
**Phyla nodiflora** (L.) Greene 3, 4, 321  
**Physalis** L. 40  
*Physalis aequata* Jacq. ex Nees 41  
**Physalis angulata** L. 41, 42  
**Physalis ixocarpa** Brot. ex Hornem. 41  
*Physalis somnifera* L. 41  
*Phyteuma sinai* A. DC. 132  
*Picridium* Desf. 298  
*Picridium tingitanum* (L.) Desf. 299  
**Picris** L. 280  
**Picris altissima** Delile 283, 281  
**Picris asplenioides** L. 280, 281  
*Picris blanchiana* Boiss. 282  
*Picris coronopifolia* (Desf.) DC. 280  
**Picris cyanocarpa** Boiss. 282, 281  
*Picris damascena* Boiss. & Gaill. 282  
var. *diffusa* Eig 282  
var. *homocarpa* Eig 282  
var. *persistens* Eig 282  
*Picris echioides* L. 279  
*Picris integrifolia* Desf. 283  
*Picris laxa* DC. 283  
**Picris longirostris** Sch.Bip. 282, 281  
*Picris lyrata* Delile 280  
*Picris pilosa* Delile 280  
*Picris radicata* (Forssk.) Less. 280  
*Picris sprengeriana* (L.) Chaix 283  
*Picris sprengeriana* (L.) Poir. 283  
**Picris strigosa** M. Bieb. 285  
**Picris sulphurea** Delile 283, 281  
**PLANTAGINACEAE** 108  
**Plantago** L. 108  
*Plantago aegyptiaca* Jacq. 112  
**Plantago afra** L. 113, 111  
**Plantago albicans** L. 119, 118  
**Plantago altissima** L. 120  
**Plantago amplexicaulis** Cav. 117, 118, 335  
subsp. *bauphula* (Edgew.) Rech. f. 117  
*Plantago arabica* Boiss. 110  
**Plantago arenaria** Waldst. & Kit. 112, 111  
*Plantago bauphula* Edgew. 117  
**Plantago bellardii** All. 120  
*Plantago chamaepsyllium* Zohary 112  
**Plantago ciliata** Desf. 119, 118  
**Plantago commutata** Guss. 115  
**Plantago coronopus** L. 115, 335  
subsp. *commutata* (Guss.) Pilg. 115  
**Plantago crassifolia** Forssk. 116, 114  
**Plantago crypsoides** Boiss. 113, 114, 334



- Plantago cylindrica** Forssk. 119, 118, 335  
*Plantago decumbens* Forssk. 120  
**Plantago exigua** Murray 113, 111  
*Plantago indica* L. 112  
*Plantago intermedia* Gilib. 117  
**Plantago lagopus** L. 116, 114  
**Plantago lanceolata** L. 116, 114  
*Plantago lusitanica* L. 116  
**Plantago macrorhiza** Poir. 115  
**Plantago major** L. 117, 114, 335  
   subsp. *intermedia* (Gilib.) Lange 117  
*Plantago maritima* L. 116  
   subsp. *crassifolia* (Forssk.) Holmboe 116  
**Plantago notata** Lag. 117, 118  
**Plantago ovata** Forssk. 120, 118, 336  
*Plantago parviflora* Desf. 113  
**Plantago phaeostoma** Boiss. & Heldr. 110, 111  
*Plantago psyllium* L. 110, 112, 113  
   var. *sinaica* Barn. 110  
*Plantago pumila* L.f. 113  
*Plantago ramosa* Asch. 112  
*Plantago sarcophylla* Boiss. ex Zohary 112  
*Plantago scabra* Moench 112  
**Plantago sinaica** (Barn.) Decne. 110, 111  
**Plantago squarrosa** Murray 112, 111  
*Plantago weldenii* sensu auct. 115  
*Platychaete* Boiss. 217  
*Plectocephalus* D. Don 162  
*Plectranthus hadiensis* sensu Boulos 8  
**Pluchea** Cass. 189  
**Pluchea dioscoridis** (L.) DC. 189, 188, 342  
   var. *glabra* Oliv. & Hiern 189  
*Polycephalos suaveolens* Forssk. 195  
**Prasium** L. 31  
**Prasium majus** L. 31, 32, 326  
*Prenanthes procumbens* Roxb. 293  
*Prenanthes spinosa* Forssk. 291  
**Priva** Adans. 2  
*Priva abyssinica* Jaub. & Spach 2  
**Priva adhaerens** (Forssk.) Chiov. 2, 4  
*Priva cordifolia* sensu auct. 2  
*Priva dentata* Juss. 2  
*Psammoseris arabica* Boiss. & Heldr. 303  
**Pseudoconyza** Cuatrecasas 189  
*Pseudoconyza lyrata* (Kunth) Cuatrec. 190  
**Pseudoconyza viscosa** (Mill.) D'Arcy 190, 188  
**Pseudognaphalium** Kirp. 207  
**Pseudognaphalium luteoalbum** (L.) Hilliard & B. L. Burt 207, 206  
*Psyllium sinaicum* (Barn.) Holub 110  
**Pterocephalus** Adans. 126  
**Pterocephalus arabicus** Boiss. 128  
**Pterocephalus brevis** Coult. 128, 127  
*Pterocephalus caramanicus* Boiss. & Heldr. 126  
*Pterocephalus coulteri* Boiss. 128  
*Pterocephalus involucratus* (Sm.) Spreng. 128  
*Pterocephalus papposus* (L.) Coult. 126  
**Pterocephalus plumosus** (L.) Coult. 126, 127  
**Pterocephalus sanctus** Decne. 128, 127  
*Pterotheca* Cass. 299  
**Pulicaria** Gaertn. 217  
**Pulicaria arabica** (L.) Cass. 221, 218  
   subsp. *arabica* 221  
*Pulicaria aspera* Pomel 220  
*Pulicaria chrysopsoides* Schweinf. 219  
*Pulicaria crispa* (Forssk.) Oliv. 221  
*Pulicaria demissa* Boiss. 221  
*Pulicaria desertorum* DC. 220  
*Pulicaria elata* Boiss. 221  
**Pulicaria incisa** (Lam.) DC. 219, 218, 345  
   subsp. *candolleana* E. Gamal-Eldin 220  
   subsp. *incisa* 220  
**Pulicaria inuloides** (Poir.) DC. 220, 218  
*Pulicaria laniceps* Bornm. 221  
*Pulicaria longifolia* Boiss. 220  
**Pulicaria petiolaris** Jaub. & Spach 219, 218  
*Pulicaria pratensis* Scheele 220  
**Pulicaria sicula** (L.) Moris 219, 218  
*Pulicaria trichocephala* DC. 221  
**Pulicaria undulata** (L.) C. A. Mey. 221  
   subsp. *undulata* 221, 218, 346  
*Pulicaria undulata* sensu Boiss. 219  
**Pulicaria vulgaris** Gaertn. 220  
*Pyrethrum* Zinn 255  
*Pyrethrum santolinoides* DC. 255  
*Pyrethrum acmella* (L.) Medic. 232  
**Reichardia** Roth 298  
**Reichardia picroides** (L.) Roth 299  
**Reichardia tingitana** (L.) Roth 299, 296, 352  
   var. *arabica* (Hochst. & Steud.) Asch. & Schweinf. 299  
   var. *orientalis* (L.) Asch. & Schweinf. 299  
*Rhabdotheca spinosa* (Forssk.) Webb 291  
*Rhabdotheca tenuiloba* Pomel 298  
**Rhagadiolus** Juss. 275  
*Rhagadiolus angulosus* (Jaub. & Spach) Kupicha 273  
*Rhagadiolus hedynois* Fisch. & C. A. Mey. 273  
*Rhagadiolus koelpinia* (L.f.) Willd. 273  
**Rhagadiolus stellatus** (L.) Gaertn. 275, 274  
*Rodigia* Spreng. 299  
**Rogeria** J. Gay ex Delile 106  
**Rogeria adenophylla** J. Gay ex Delile 106, 105  
**Ruellia** L. 101  
*Ruellia adhaerens* Forssk. 2  
**Ruellia patula** Jacq. 101, 102  
**Salvia** L. 17  
*Salvia acetabulosa* sensu Täckh. 20  
**Salvia aegyptiaca** L. 18, 19, 322  
**Salvia deserti** Decne. 20, 19, 323  
**Salvia dominica** L. 20, 19

- Salvia graveolens* Vahl 20  
*Salvia lanigera* Poir. 20, 19, 323  
*Salvia multicaulis* Vahl 20, 19, 323  
*Salvia palaestina* Benth. 21  
*Salvia pinardii* sensu Täckh. 20  
*Salvia pumila* Benth. 18  
*Salvia sclarea* L. 21  
*Salvia spinosa* L. 21, 23, 324  
*Salvia verbenaca* L. 20, 23  
*Santolina fragrantissima* Forssk. 249  
*Santolina sinaica* Fresen. 255  
*Santolina terrestris* Forssk. 249  
*Satureja biflora* (Buch.-Ham. ex D. Don) Briq. 16  
*Satureja capitata* L. 13  
*Satureja imbricata* (Forssk.) Briq. 16  
*Satureja myrtifolia* (Boiss. & Hohen.) Greuter & Burdet 16  
*Satureja nervosa* Desf. 16  
*Satureja plumosa* Hampe 16  
*Satureja serbaliana* (Danin & Hedge) Greuter & Burdet 14  
*Satureja sinaica* (Benth.) Briq. 14  
*Saulcyia hierochuntica* Michon 225  
**Scabiosa** L. 123  
*Scabiosa arenaria* Forssk. 125, 124  
*Scabiosa aucheri* Boiss. 125  
*Scabiosa eremophila* Boiss. 125, 124  
*Scabiosa involucrata* Sm. 128  
*Scabiosa olivieri* Coult. 125, 124  
*Scabiosa palaestina* L. 123, 124  
*Scabiosa plumosa* (L.) Sm. 126  
*Scabiosa prolifera* L. 123  
*Scabiosa rhizantha* Viv. 125  
*Scabiosa syriaca* L. 122  
*Scabiosa tenuis* Spruner 126  
*Scariola* F.W. Schmidt 315  
*Scariola orientalis* (Boiss.) Soják 315, 314  
*Sceura marina* Forssk. 5  
**Schweinfurthia** A. Br. 68  
*Schweinfurthia aptera* (Vatke) Dyer  
**Schweinfurthia pedicellata** (T. Anderson) Balf. f. 69, 71  
**Scolymus** L. 269  
*Scolymus hispanicus* L. 269, 268  
*Scolymus maculatus* L. 269, 268  
*Scopolia boveana* Dunal 50  
*Scopolia datora* (Forssk.) Dunal 50  
*Scopolia mutica* (L.) Dunal 50  
**Scorzonera** L. 286  
*Scorzonera alexandrina* Boiss. 287  
*Scorzonera drarii* Täckh. 287  
*Scorzonera edumea* Eig 287  
*Scorzonera judaica* Eig 289, 288  
*Scorzonera mollis* M. Bieb. 289, 288  
     var. *longifolia* Boiss. 289  
*Scorzonera orientalis* L. 299  
*Scorzonera picroides* L. 299  
*Scorzonera pseudolanata* Grossh. 289  
**Scorzonera schweinfurthii** Boiss. 287, 288  
*Scorzonera syriaca* Boiss. & Blanche 289  
*Scorzonera tingitana* L. 299  
**Scorzonera undulata** Vahl 287, 288, 351  
**Scrophularia** L. 70  
*Scrophularia arguta* Sol. 70, 71  
*Scrophularia canina* L. 73  
*Scrophularia deserti* Delile 72, 71  
*Scrophularia gileadensis* Post 72  
*Scrophularia hypericifolia* Wydler 72  
**Scrophularia libanotica** Boiss. 72, 71  
*Scrophularia marginata* Boiss. 72  
**Scrophularia sinaica** Benth. 73, 71  
**Scrophularia syriaca** Benth. 72  
**Scrophularia xanthoglossa** Boiss. 72, 71  
**SCRÓPHULARIACEAE** 54  
**Senecio** L. 262  
**Senecio aegyptius** L. 265, 264  
     var. *aegyptius* 265, 264  
     var. *discoideus* Boiss. 265  
     var. *verbenaeifolius* (Jacq.) Boiss. 265  
*Senecio arabicus* L. 265  
**Senecio belbaysius** Delile 265  
*Senecio belbeyticus* Poir. 265  
*Senecio coronopifolius* Desf. 263  
*Senecio decaisnei* DC. 262  
*Senecio desfontainei* Druce 263  
**Senecio flavus** (Decne.) Sch.Bip. 262, 264  
**Senecio glaucus** L. 262  
     subsp. *coronopifolius* (Maire) C. Alexander 263, 264, 350  
     subsp. *glaucus* 263  
**Senecio hoggariensis** Batt. & Trab. 266, 264  
*Senecio joppensis* Dinsm. 263  
*Senecio laxiflorus* Viv. 263  
*Senecio triflorus* L. 265  
*Senecio verbenaeifolius* Jacq. 265  
*Senecio vernalis* Waldst. & Kit. 263  
     var. *carnosus* Post 263  
**Senecio vulgaris** L. 263, 264  
**Seriphidium** (Besser ex Hook.) Fourr. 261  
**Seriphidium herba-album** (Asso) Soják 261, 260  
**Sesamum** L. 104  
**Sesamum alatum** Thonn. 104, 105  
*Sesamum sabulosum* A. Chev. 104  
**Silybum** Adans. 158  
**Silybum marianum** (L.) Gaertn. 158, 157, 339  
     var. *albiflorum* Eig 159  
     var. *marianum* 159  
*Simbuleta* Forssk. 59  
*Sixalix arenaria* (Forssk.) Greuter & Burdet 125  
*Sixalix eremophila* (Boiss.) Greuter & Burdet 125  
**SOLANACEAE** 34  
**Solanum** L. 35  
*Solanum alatum* Moench 39

- Solanum albicaule* Dunal 38  
*Solanum carense* Dunal 40  
*Solanum coagulans* Forssk. 36, 37, 327  
*Solanum dubium* Fresen. 36  
*Solanum elaeagnifolium* Cav. 36, 37  
*Solanum forsskaolii* Dunal 38, 37, 328  
*Solanum incanum* L. 38, 37, 327  
   var. *unguiculatum* (A. Rich.) Bitter. 38  
*Solanum jacquinii* Willd. 38  
*Solanum luteum* Mill. 39  
*Solanum miniatum* Bernh. ex Willd. 39  
*Solanum nigrum* L. 39, 37, 328  
   var. *elbaensis* Täckh. & Boulos 39  
   var. *incisum* Täckh. & Boulos 39  
   var. *nigrum* 39  
   var. *villosum* L. 39  
*Solanum schimperianum* Hochst. ex A. Rich. 40  
*Solanum sinaicum* Boiss. 40, 37  
*Solanum surattense* Burm. f. 38  
*Solanum unguiculatum* A. Rich. 38  
*Solanum villosum* (L.) Lam. 39  
*Solanum villosum* (L.) Moench 39  
*Solanum villosum* Mill. 39, 37  
   subsp. *miniatum* (Bernh. ex Willd.) Edmonds 39  
   subsp. *punicum* (Kirschleger) Edmonds 39  
   subsp. *villosum* 39  
*Solanum virginianum* L. 38  
*Solanum xanthocarpum* Schrad. & Wendl. 38  
**Sonchus** L. 308  
*Sonchus angustifolius* Neck. 309  
*Sonchus aquatilis* Pourr. 309  
*Sonchus asper* (L.) Hill 311  
   subsp. *asper* 312, 310  
   subsp. *glaucescens* (Jord.) Ball 312, 310  
*Sonchus capitatus* Spreng. 294  
*Sonchus cassinianus* Jaub. & Spach 298  
*Sonchus chondrilloides* Desf. 297  
*Sonchus ciliatus* Lam. 309  
*Sonchus gigas* Boulos 312  
*Sonchus glaber* Gilib. 309  
*Sonchus glaucescens* Jord. 312  
*Sonchus lacerus* Willd. 309  
*Sonchus macrocarpus* Boulos & C. Jeffrey 312, 310  
*Sonchus mareoticus* Delile 294  
*Sonchus maritimus* L. 309, 310, 352  
*Sonchus massauensis* (Fresen.) Sch.Bip. 293  
*Sonchus nudicaulis* (L.) Sch.Bip. 291  
*Sonchus oleraceus* L. 309, 310, 352  
   var. *asper* L. 311  
*Sonchus picroides* (L.) Lam. 299  
*Sonchus spinosus* (Forssk.) DC. 291  
*Sonchus tenerrimus* L. 311, 310  
*Spathipappus* Tzvelev. 255  
*Specularia* Heister ex A. DC. 132  
*Specularia speculum* A. DC. 132  
**Sphaeranthus** L. 195  
*Sphaeranthus abyssinicus* Steetz 195  
*Sphaeranthus kotschyi* Schweinf. 195  
**Sphaeranthus suaveolens** (Forssk.) DC. 195  
   var. *abyssinicus* (Steetz) Ross-Craig 195, 196  
   var. *suaveolens* 195, 196, 343  
*Sphaeroclinium* (DC.) Sch.Bip. 257  
**Sphenoclea** Gaertn. 134  
**Sphenoclea zeylanica** Gaertn. 134, 133  
**SPHENOCLEACEAE** 134  
*Spilanthes acmella* (L.) Murr. 232  
*Spilanthes mauritiana* (L. C. Rich.) DC. 232  
*Spilanthes mellisifolia* Salisb. 232  
*Spiropodium* F. Muell. 189  
**Stachys** L. 24  
**Stachys aegyptiaca** Pers. 24, 23, 325  
*Staelhelia spinosa* Vahl 214  
*Staurophragma* Fisch. & Mey. 55  
*Stemmatella* Wedd. ex Benth. 233  
**Striga** Lour. 84  
**Striga asiatica** (L.) Kuntze 85, 83  
**Striga gesnerioides** (Willd.) Vatke 85, 83  
**Striga hermonthica** (Delile) Benth. 84, 83, 333  
*Striga lutea* Lour. 85  
*Striga orobanchoides* (R. Br.) Benth. 85  
*Sutera dissecta* (Delile) Walp. 76  
*Sutera glandulosa* Roth 76  
**Symphotrichum** Nees 194  
**Symphotrichum squamatum** (Spreng.) Nesom 194, 196, 324  
*Synhaeta* Kirp. 207  
**Tagetes** L. 237  
**Tagetes minuta** L. 237, 235  
**Tanacetum** L. 255  
*Tanacetum santolinoides* (DC.) Feinbrun & Fertig 255  
*Tanacetum cinereum* (Delile) DC. 257  
*Tanacetum monanthos* L. 247  
**Tanacetum sinaicum** (Fresen.) Delile ex Bremer & Humphries 255, 256  
**Taraxacum** F. H. Wigg. 316  
**Taraxacum minimum** (Guss.) N. Terracc. 316, 314  
**Taraxacum turcicum** Soest 316  
*Tecmarsis* DC. 189  
**Teucrium** L. 31  
**Teucrium brevifolium** Schreb. 33  
**Teucrium decaisnei** C. Presl 33  
*Teucrium iva* L. 34  
**Teucrium leucocladum** Boiss. 33, 32  
*Teucrium pilosum* (Decne.) Asch. & Schweinf. 33  
**Teucrium polium** L. 33, 32, 326  
   var. *pilosum* Decne. 33  
*Teucrium sinaicum* Boiss. 33  
*Thrinicia* Roth 276  
*Thrinicia tripolitana* Sch.Bip. ex Coss. 278

- Thrinicia tuberosa* (L.) DC. 278  
**Thymus** L. 13  
*Thymus biflorus* Buch.-Ham. ex D. Don 16  
**Thymus bovei** Benth. 13, 15  
**Thymus capitatus** (L.) Link 13, 15  
**Thymus decussatus** Benth. 14, 15  
*Thymus imbricatus* Forssk. 16  
*Tomanthea* DC. 162  
**Tragopogon** L. 285  
*Tragopogon australis* Jord. 285  
*Tragopogon coelesyriacus* Boiss. 285  
**Tragopogon collinus** DC. 286, 284  
*Tragopogon hybridum* L. 286  
*Tragopogon longirostris* Bisch. ex Sch.Bip. 285  
*Tragopogon picroides* L. 275  
**Tragopogon sinuatus** Avé-Lall 285, 284  
**Tripleurospermum** Sch.Bip. 250  
**Tripleurospermum auriculatum** (Boiss.)  
 Rech.f. 251, 252  
*Tripteris vaillantii* Decne. 267  
*Tyloglossa kotschyi* Hochst. 103  
**Urospermum** Scop. 275  
**Urospermum picroides** (L.) F. W. Schmidt  
 275, 277  
**Utricularia** L. 107  
*Utricularia exoleta* R. Br. 107  
*Utricularia gibba* L. 107  
 subsp. *exoleta* (R. Br.) P. Taylor 107  
**Utricularia gibba** L. 107, 105  
**Utricularia inflexa** Forssk. 107, 105  
*Utricularia stellaris* L.f. 107  
*Valeriana locusta* L. 121  
 var. *discoidea* L. 121  
 VALERIANACEAE 121  
**Valerianella** Mill. 121  
*Valerianella aucheri* Boiss. 121  
*Valerianella discoidea* (L.) Loisel. 121  
*Valerianella persica* Boiss. 121  
*Valerianella petrovitchii* Asch. 121  
*Valerianella szovitsiana* Fisch. & C. A. Mey.  
 121, 124  
*Varthemia candicans* (Delile) Boiss. 216  
*Varthemia iphionoides* Boiss. & Blanche 217  
*Varthemia montana* (Vahl) Boiss. 216  
**Verbascum** L. 55  
**Verbascum decaisneanum** Kuntze 59  
**Verbascum eremobium** Murb. 58  
**Verbascum fruticulosum** Post 56, 57  
**Verbascum letourneuxii** Asch. & Schweinf.  
 56, 57, 331  
**Verbascum schimperianum** Boiss. 56, 57  
**Verbascum sinaïticum** Benth. 58, 57, 331  
**Verbascum sinuatum** L. 58, 57, 332  
 var. *adenosepalum* Murb. 58  
 var. *sinuatum* 58  
**Verbena** L. 3  
*Verbena nodiflora* L. 3  
**Verbena officinalis** L. 3, 4  
**Verbena supina** L. 5, 4  
 VERBENACEAE 1  
**Verbesina** L. 236  
*Verbesina acmella* L. 232  
*Verbesina alba* L. 230  
**Verbesina encelioides** (Cav.) Benth. ex  
 A. Gray 237, 235, 348  
*Verbesina lanceolata* Poir. 232  
*Verbesina prostrata* L. 230  
*Vermifuga corymbosa* Ruiz & Pav. 238  
*Vermifuga* Ruiz & Pav. 238  
**Veronica** L. 78  
*Veronica accessoria* Rech. f. 81  
**Veronica anagallis-aquatica** L. 82, 83  
**Veronica anagalloides** Guss. 82, 84  
 subsp. *taeckholmiorum* Chrtek & Osb.-Kos.  
 82  
**Veronica biloba** Schreb. 79, 80  
*Veronica buxbaumii* Ten. 79  
**Veronica campylopoda** Boiss. 81, 80  
**Veronica catenata** Pennell 84  
 subsp. *pseudocatenata* Chrtek & Osb.-Kos.  
 84  
*Veronica didyma* sensu auct. 79  
*Veronica iranica* Rech. f. 81  
*Veronica islensis* E. Gamal-Eldin 81  
**Veronica kaiserii** Täckh. 81  
*Veronica musa* Täckh. & Hadidi 81  
**Veronica persica** Poir. 79, 80  
**Veronica polita** Fr. 79, 80  
*Veronica pseudodivariata* Parsa 81  
**Veronica rubrifolia** Boiss. 81  
 subsp. *respectatissima* M. A. Fisch. 81, 80  
**Veronica scardica** Griseb. 82  
 subsp. *africana* Chrtek & Osb.-Kos. 82  
**Veronica syriaca** Room. & Schult. 79, 80  
*Vigneixia* Pomel 279  
*Virgulastr* Semple 194  
*Virgulus* Raf. 194  
*Volkameria acerbiana* Vis. 26  
*Volkameria alata* (Thonn.) Kuntze 104  
**Volutaria** Cass. 174  
**Volutaria crupinoides** (Desf.) Maire 177  
*Volutaria leucantha* (Coss. ex Batt.) Maire 176  
**Volutaria lippii** (L.) Cass. ex Maire  
 176, 175, 341  
**Volutaria sinaica** (DC.) Wagentiz 174, 175  
**Volutaria tubuliflora** (Murb.) Sennen.  
 176, 175  
*Wagenitzia* Dostál 162  
**Wahlenbergia** Schrad. ex Roth 129  
**Wahlenbergia campanuloides** (Delile) Vatke  
 129, 127  
*Wahlenbergia cervicina* A. DC. 129  
*Wahlenbergia etbaica* (Schweinf.) Vatke 130  
**Wahlenbergia lobelioides** (L.f.) Link 130  
 subsp. *nutabunda* (Guss.) Murb. 130  
 subsp. *riparia* (A. DC.) Thulin 130, 127  
*Wedelia gossweileri* S. Moore 233  
**Withania** Pauquy 41

- Withania obtusifolia** Täckh. 43, 42, 329  
**Withania somnifera** (L.) Dunal 41, 42, 328  
**Xanthium** L. 227  
*Xanthium brasiliicum* Vellozo 229  
*Xanthium cavanillesii* Schouw 229  
*Xanthium indicum* König ex Roxb. 229  
*Xanthium italicum* Moretti 229  
**Xanthium spinosum** L. 227, 228  
*Xanthium strumarium* L. 229  
     subsp. *cavanillesii* (Schouw) D. Löve & Dansereau 229  
     subsp. *italium* (Moretti) D. Löve 229  
**Xanthium strumarium** L. 229, 228, 347  
*Ximenesia encelioides* Cav. 237  
*Youngia procumbens* (Roxb.) DC. 293  
*Zacintha* Mill. 299  
**Ziziphora** L. 17  
**Ziziphora capitata** L. 17, 19  
**Ziziphora tenuior** L. 17, 19  
**Zoegea** L. 161  
**Zoegea purpurea** Fresen. 161, 164  
*Zollikoferia* DC. 290  
*Zollikoferia arabica* Boiss. 295  
*Zollikoferia cassiniana* (Jaub. & Spach) Boiss. 298  
*Zollikoferia fallax* (Jaub. & Spach) Boiss. 294  
*Zollikoferia foxii* Post 295  
*Zollikoferia glomerata* (Cass.) Boiss. 294  
*Zollikoferia massauensis* (Fresen.) Boiss. 293  
*Zollikoferia mucronata* (Forssk.) Boiss. 297  
*Zollikoferia nudicaulis* (L.) Boiss. 291  
*Zollikoferia spinosa* (Forssk.) Boiss. 291  
*Zollikoferia tenuiloba* Boiss. 297  
*Zollikoferia tenuilobes* (Pomel) Batt. 298